



EXPERT PERSPECTIVES

Supporting a Just and Climate-Resilient Transition in South Africa



**PRESIDENTIAL
CLIMATE COMMISSION**
TOWARDS A JUST TRANSITION



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FOREWORD

A young woman in Johannesburg's Alexandra township works in a community garden that has been transformed from an old dumping ground. A smallholder farmer in the Olifants catchment uses improved seeds that are more tolerant of higher temperatures and reduced rainfall. A large South African insurance group identifies climate-vulnerable communities and equips them with firefighting equipment to tackle small fires before they become runaway blazes.

This is what climate adaptation in South Africa looks like; it is ingenuity in the face of significant challenges, experimentation in a rapidly shifting landscape. Examples like these are taking root and beginning to spread, but of course not all communities have the same capacity to adapt, and those in risk-prone areas and living in poverty are most vulnerable.

We have a moral responsibility to enhance our resilience to the impacts of climate change, in a way that improves lives and livelihoods for all. This includes enhancing climate resilience, taking action to ensure that our communities can withstand climate risks, as well as broader societal resilience, empowering people and strengthening policies to ensure more just, equal and sustainable outcomes.

The sooner we act, the better off we will be.

The book you are holding contains essays written by leading experts in their fields, exploring what it will take to achieve a just and climate-resilient transition in South Africa. The subject matter is wide-ranging—from building resilience in our energy

system and empowering informal waste pickers to increasing competition in food markets and expanding workers' collective bargaining rights—illustrating the scale of the challenges and opportunities that lie ahead. The authors are drawn from diverse backgrounds, representing views from South African academia, business, labour and civil society.

The book is compiled in the spirit of the Presidential Climate Commission—promoting our citizens' capacity to engage in and influence the decisions that impact their lives. While the book cannot do justice to all the topics that policymakers will confront in planning for a climate-resilient transition, it provides insights into what is possible.

We hope that you will find inspiration in the pages that follow. Climate change is here, and its impacts are growing more severe. But we have reasons to hope. We are a resilient nation, with South Africans experienced in finding ingenious solutions in turbulent and difficult times. With leadership, ingenuity, resourcefulness and collaboration, I am confident that we can withstand—and indeed thrive—in the face of the most extraordinary challenges.

Let's get to work.



Valli Moosa

Deputy Chair
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OUR TRANSITION



Transformative Resilience as the Centrepiece of a Just Transition

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Through its sixth and latest assessment cycle reports, the Intergovernmental Panel on Climate Change (IPCC) has established that the human influence on our climate has been *unequivocal*, the scale of these changes is *unprecedented* and many of these changes are *irreversible* (IPCC 2021d). While *mitigating* climate change—through a just transition away from fossil fuels—has been the defining response, the need to build *resilience* against the inevitable effects of a changing climate is a central point in the latest report of the IPCC's Working Group II (IPCC 2022b). *Resilience*—notwithstanding disagreements over its definition—is a pillar of adapting to climate change (adaptation). A resilient socio-ecological system 'retains core structures and functions in the face of significant disturbance, while still retaining options to develop' (Tanner and

Horn-Phathanothai 2014). At its core, *resilience* refers to the ability of social, economic and ecosystems to anticipate, prepare for and respond to hazardous events, trends or disturbances.

This raises normative questions of 'resilience for whom and for what' (Cote and Nightingale 2011)—in a nutshell, does building resilience to a changing climate entrench or transform our existing social, political, economic and ecological systems? Who benefits and loses from this? Without a thorough interrogation of these questions, resilience measures risk preserving the unequal status quo, as climate impacts cannot be disentangled from their developmental impacts. Not only would this be extremely unjust, but, as stated by the IPCC, to simply advance coping strategies that prioritise "bouncing back" is an increasingly insufficient goal' (Lavell et al. 2012, 34), as it must be complemented by adaptation strategies of 'bouncing back better' (Tanner and Horn-Phathanothai 2014). We need to think about whether the existing state of a socio-ecological system is desired and who benefits from it. Bahadur et al. (2013) have identified several characteristics of resilience:

- a high level of diversity in terms of adaptation and livelihood options
- effective governance and institutions that are connected across scales
- embracing uncertainty and change, rather than resisting it
- a high degree of equity

South Africa's history and political economy have made the country extremely vulnerable to the impacts of climate change and to the risks that a transition away from fossil fuels entails. While this applies to the economy and society as a whole, certain racial, gender and class communities are more vulnerable to these risks than others. Therefore, while resilience needs to be built in across the system, attention must be paid to particularly vulnerable individuals, households and communities. This requires a transformative approach to resilience, one founded on transformative social policies aimed at achieving socio-ecological well-being, a state defined as sustained ecological resilience in which 'human needs are met and the quality of life of individuals is maintained' (Brueckner-Irwin et al. 2019, n.p.).

In what follows we propose a framework for pursuing a transformative social policy agenda that speaks to South Africa's political economy by situating resilience as the centrepiece of our just transition framework. The framework embodies the first and last salient features of resilience identified by Bahadur et al. (2013) and outlined above (i.e.

While resilience needs to be built in across the system, attention must be paid to particularly vulnerable individuals, households and communities.

a high level of diversity in adaptation and livelihood options, as well as a high degree of equity). First, we outline how South Africa's political economy has contributed to the vulnerability of its people in the face of multiple socio-ecological crises.

SOUTH AFRICA'S POLITICAL ECONOMY AND SOCIO-ECOLOGICAL CRISES

Three features of South Africa's political economy have contributed to the country's socio-ecological crises: the fossil-fuel-dependent system of capitalist accumulation, the prevailing macroeconomic framework and the related spatial inequality.

South Africa's high carbon emissions are rooted in a fossil-fuel-dependent system of capitalist accumulation termed the minerals-energy complex (MEC) (Fine and Rustomjee 1996b). At one level, the MEC is the dominant industrial structure comprising key sectors in mining, energy and related industries with strong inter-sectoral linkages, operating in isolation from (particularly) labour-intensive non-MEC sectors (excluding finance). At another level, the MEC is constituted by vested interests within the state and fractions of capital that shape economic policy in their favour through conflict and compromise. While non-MEC service sectors—particularly, retail, telecommunications, and business services—have grown since apartheid, these do not provide a basis for 'structural transformation': the ability to shift the economy towards more productive, labour-intensive, higher-skilled and higher-value-added activities. This growth path has itself been shaped by the interests of a financialised MEC, prioritising, for example, liberalisation over industrialisation.

The multiple social (unemployment, impoverishment, poverty and inequality) and environmental crises that South Africa faces result in part from the MEC and an orthodox macroeconomic framework. Structural unemployment and impoverishment define the economy, in part, because the MEC is dominated by upstream sectors that are highly capital-intensive; that is, they employ more machinery than workers. The MEC is also

highly concentrated, with a few major firms enjoying preferential access to key resources such as minerals, land, water and energy. Thanks to liberalisation of the financial sector and capital accounts, investments by companies linked to the MEC are mainly in short-term and speculative financial assets, rather than in employment-generating productive activities, particularly ones that do not harm the environment. The highly financialised nature of the MEC exacerbates existing wealth inequality. Added to this, the sidelining of public investment, and the waste of public resources through corruption and maladministration, has been reinforced by austerity measures, reducing the ability of sustainable and productive sectors to create jobs. The MEC is part of a system that also exploits Black labour through low wages and poor working conditions and devalues reproductive labour without bearing the social costs. Finally, the MEC has contributed to environmental degradation and climate change due to its appropriation and intensive use of subsidised fossil-fuel-based energy.

Supported by apartheid segregation policies, the MEC has also shaped the geographical location of economic activity, the urban working class and greenhouse gas (GHG) emissions. The historical location of mineral endowments in Johannesburg and Tshwane spurred the growth and concentration of industrial activity, particularly heavy industry manufactures, in these regions. However, inefficient and unequal land use, resulting in urban sprawl, and inequalities in public service distribution have contributed to high GHG emissions from transport, as industrial activities are far from the coast for international trade. Moreover, inequalities in land use have affected the urban working class, whose members tend to live far from work opportunities, in areas with insufficient quality public social infrastructure such as health-care facilities and parks.

Spatial inequalities are prevalent in rural areas too. Ownership of and access to land in South Africa is highly unequal, deeply racist and largely private (DLDLR 2017). This continues a history that has systematically deprived Black people, and particularly Black women, of land access, ownership and security. The country's market-based land reform has been ineffective at bringing about equality. On the one hand, the restitution process



has been slow and has reinforced gender inequality, with evictions of farmworkers and women increasing since 1994. On the other, land and market reforms have deepened the concentration of rural land ownership by white, capital-intensive farmers.

THREE PILLARS OF RESILIENCE FOR A TRANSFORMATIVE JUST TRANSITION

We have reviewed how South Africa's political economy has contributed to the socio-ecological crisis. This section will outline three pillars as part of a transformative social policy agenda for prioritising resilience, responding to the existing conditions of South Africa's political economy. In what follows, we outline how policies for a green decent work agenda, social protection and land reform would help build resilience for a transformative just transition. A green decent work agenda would contribute to resilience by supporting the creation of sustainable livelihoods and decent jobs in climate mitigation and adaptation interventions. Social protection provides safety nets for vulnerable communities to cope with climate change impacts. Finally, secure access to productive land reduces exposure to climate risks, building resilience by helping people adapt so they can create livelihoods, strengthen their food security through subsistence farming or improve their access to credit by using their land as collateral.

Ensuring adequate and quality access to these measures would build resilience, reinforcing the ability of marginalised South Africans to cope with and adapt to the climate crisis and transitional risks.

Pillar 1: Green decent work agenda

A green decent work agenda (GDWA) can contribute to climate resilience in two ways. First, a GDWA contributes to resilience by creating *sustainable livelihoods* (in climate-mitigating and adaptation sectors) that empower workers to adapt to climate shocks. While a livelihood encompasses material and social capabilities and incomes necessary for a means of living, a sustainable livelihood is one that can cope and recover from socio-ecological shocks or crises and improve current and future capabilities and assets without compromising the natural resource base. Second, a GDWA supports job creation in climate-mitigating and adaptation sectors that can also build resilience. Climate-adaptation sectors include not only water conservation and harvesting, drought proofing, flood control and the protection and creation of climate-resilient infrastructure (roads, buildings) but also social services (health care, education).

Work that promotes resilience must be not only green but also decent. The International Labour Organisation's Decent Work Agenda (DWA) best demonstrates how workers' well-being can be promoted through decent work regimes. The DWA comprises four pillars: job creation, social protection, labour standards and rights at work, and social dialogue, all important contributors to a worker's sustainable livelihood and well-being. The three following complementary policies are needed to promote green decent work (adapted from Straus et al. 2021).

Policies for a green decent work agenda, social protection and land reform would help build resilience for a transformative just transition.

- *Green macroeconomic policy*, comprising fiscal and monetary policies, which help to generate green decent work by augmenting the aggregate demand for, and aggregate supply of, socio-ecologically useful goods and services. Deliberately expanding aggregate demand can create green jobs by changing the level and composition of expenditure towards socio-ecologically useful goods and services. This can be achieved through expenditure-raising policies (e.g. government spending, monetary policy measures) supported by revenue-raising policies (e.g. commensurate wealth, land and carbon taxes). It can also be achieved through expenditure-switching policies (e.g. exchange rate management, import tariffs) that promote domestic production and exports over imports. Using macroeconomic policy to directly target expanding aggregate supply can generate the conditions necessary for green jobs. This can be achieved through measures to increase the availability and quality of factors needed in the sustainable production of socio-ecologically useful goods and services. For instance, adequate spending on human development, especially health and education, is critical to ensuring that workers are available and have the skills needed for green jobs. Similarly, physical investment, for example, in improved water management systems, will make industries such as agriculture more resilient.
- *Green industrial policy*, supported by green macroeconomic policy, must restructure the MEC to move it away from fossil fuels, reduce GHG emissions and diversify the productive base towards socio-ecologically useful goods and services that promote socio-ecological well-being through their employment intensity,

carbon neutrality and support for climate resilience. Climate policy should promote the creation of these decent green jobs in sectors such as climate-resilient infrastructure (railroads, buildings), social services (health care, education) and water conservation and harvesting. Localisation measures, such as public procurement, subsidies and technological transfer, can be used to build capabilities in these sectors.

- *Green labour market policies* can build climate resilience by directly supporting worker well-being and enterprises. Green labour market policies can help improve the balance between the demand and supply for labour in environmentally sustainable productive activities. This can be achieved, for example, through measures that support human capabilities (e.g. skills training). Moreover, green labour market policies can support worker well-being through measures that improve worker conditions to create a green decent work regime. These measures include minimum and maximum requirements for working time, equal opportunity and treatment, safety in the work environment, access to social protection (e.g. paternity and maternity leave, pensions, unemployment insurance), social dialogue, living wages and work stability and security. A *job guarantee* (see Box 1) is an example of how job security can be augmented in the face of climate and transitional risks.

Pillar 2: Social protection

Social protection can provide safety nets for vulnerable communities in the face of climate change. Furthermore, social protection improves resilience, reducing economic pressures and inequalities that vulnerable communities face by providing access to financial resources, such as unemployment insurance, pension grants, saving schemes or cash transfers (Godfrey-Wood and Flower 2017). Social protection builds direct resilience through absorptive capacity, anticipatory capacity and adaptive capacity (Bahadur et al. 2015). For example, during and after climate disasters such as flooding, heat waves and droughts, absorptive capacity allows vulnerable communities to absorb and cope with shocks and stresses. In contrast, anticipatory capacity builds direct resilience and allows communities to plan and prepare for climate shocks to reduce the impacts. Finally, adaptive capacity, according to Bahadur et al. (2015), provides long-term resilience, as it enables communities to learn and adjust after a climate disaster to reduce vulnerability to similar shocks in the future, thereby helping them adapt to multiple and long-term climate risks. Thus, social protection is also a key element in a just transition (Godfrey-Wood and Flower 2017).

Box 1 • Job Guarantee

Assurances have been offered about the number of jobs that will be created through renewable energy generation based on a range of models. A job guarantee is a public employment scheme which can improve resilience to climate change by minimising the impoverished worker's exposure to transition risks, transferring these risks to the state as the employer of last resort. This scheme can be a safety net to smooth income fluctuations and accumulate assets to manage climate-related shocks. Moreover, it can be part of public employment schemes in the construction, maintenance and provision of public goods that increase resilience. By providing guaranteed alternative work opportunities, the scheme also shifts power relations towards the empowerment of workers in the labour market.

In South Africa, research is currently being undertaken to support the implementation of a universal basic income guarantee (UBIG) as a way to provide social protection to citizens (IEJ 2021). Unlike social grants or welfare support only offered to a selected group based on certain financial criteria, the UBIG provides a minimum income in cash to everyone in South Africa to meet their basic needs (IEJ 2021). In addition, the UBIG is substantial enough to cover basic needs, while current social grants barely cover households' basic necessities. Thus, in communities affected by climate change impacts, a UBIG could make the jobless and those at risk of losing their jobs more resilient (IEJ 2021). Successful rollout of the UBIG will be essential for a just transition that addresses South Africa's three biggest challenges—inequality, unemployment and poverty—which will all be exacerbated by climate change.

Pillar 3: Land reform

Climate change places additional pressure on land, particularly on land-based livelihoods, biodiversity, infrastructure and food systems. Global findings show that inclusive and redistributive land policies can provide security and flexibility for adaptation in the face of climate change (IPCC 2019). Given the unequal access to land, most South Africans are extremely vulnerable to a variety of shocks and crises, including floods, fires and droughts. People are forced to reside on marginal, degraded or unproductive land, which increases their exposure to risk and reduces their adaptive capacity, as marginal land cannot be used for livelihood creation, food security through subsistence farming or collateral (Mitchell and McEvoy 2019). Lack of access to land forces people to live in



a focus only on ‘commercially viable’ enterprises, as has increasingly defined South Africa’s land reform strategy (Hall 2004). South Africa needs a pro-poor, state-led redistribution agenda. This includes prioritising land for farmworkers, labour tenants and landless people in both rural and urban areas; improved legislation, monitoring and evaluation to address the extensive corruption and slow pace of land reform; and financial resources focused on providing resources

informal settlements with non-existent or poor-quality public services, increasing their vulnerability to climate impacts. In combination with other factors we have discussed, unequal access to land severely undermines the well-being and resilience of individuals, households and communities. It also puts significant pressure on people who have precarious access to land and risks rolling back the small gains made in land redistribution. Unless adequately addressed, these pressures may result in the further consolidation and concentration of land ownership, as smallholders become unable to cope with the severity and variability of climate impacts.

Building a more resilient and just land system will require radical redistributive land reform and associated extension and public services. A just land system allows for transformative resilience from climate impacts as people’s adaptive capacity is strengthened. This occurs partly through the ‘traditional’ goals of land reform, such as poverty and inequality reduction, which in themselves increase resilience.

Land distribution addresses inequality at one of its root causes. It is not only about redistributing wealth but also one of the means of producing wealth, and the power that resides with it (Borras and Franco 2018). This can bring restorative justice in the context of South Africa’s history of dispossession, in both material and intangible ways. Furthermore, secure access to land provides residents with the flexibility to introduce climate-adaptation measures, including through traditional knowledge systems; allows for increased diversification of livelihoods; protects people from eviction or loss of land during times of crisis or disaster; provides incentives to invest in the land; and, through the recognition of communal rights, allows for cooperation and security among communities (Murken and Gornott 2022). However, transformative resilience through a just land system cannot be achieved through market-based mechanisms and

and capacity support to recipients, not on buying back land at high prices (Mtero et al. 2019). Furthermore, land reform policies must be coupled with water rights, sustainable housing and transport infrastructure to truly empower people, particularly ones living in rural areas, with the adaptive capacity required. This must be done with participatory land use planning which combines climate change projections, the needs of communities and prospects for mitigation and adaptation measures, such as agroecology and agroforestry, water saving, landscape diversification, biodiversity conservation and improved soil, crop and livestock management (IPCC 2019).

CONCLUSION

Resilience, like so many other terms used in the environmental debate, has been mainstreamed, misused and co-opted to varying degrees in different contexts. *Transformative resilience* allows us to think beyond the potentially regressive interpretations of the word and to highlight its transformative potential to help protect households and communities from the uncertainties and volatilities of climate change impacts. This requires fundamentally changing the structures which underpin South Africa’s vulnerabilities. By doing so, the three pillars we have outlined—a green decent work agenda, social protection and land reform—can provide a safety net of resilience, acting in complementary and mutually reinforcing ways to support well-being in an uncertain and volatile world. This shifts the focus away from requiring people to continuously adapt to precarious living conditions and instead aims to transform the structural inequities and injustices largely responsible for fuelling vulnerability in the first place.



A Just Transition for All, with Open Democracy and Joined-Up Mitigation and Adaptation

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This essay addresses three related imperatives: that a just transition must be for all, that mitigation and adaptation must be thought of together, and that the neoliberal regime of austerity, secrecy and corruption must be transformed into an open democracy founded on deep participation and accountability.

THE MINERALS-ENERGY COMPLEX

Over the last century, South Africa's economy was dominated and shaped by the minerals-energy complex (MEC) (Fine and Rustonjee 1996a). This has made for a highly concentrated economy—one in which wealth and the power to direct development is held by a very few large corporations—and produced one of the most energy- and carbon-intensive economies in the world. Its carbon intensity and heavy pollution result

from two fundamental and related factors: South Africa's reliance on coal as its primary energy source and its long-term policy of supplying cheap and abundant electricity to industry—a policy that is still in place although heavily eroded in practice.

Development directed by the MEC also produced one of the most unequal countries in the world (Chancel et al. 2022). Income inequality has intensified since the first democratic elections in 1994. Levels of poverty are extreme and still defined by race, class, gender and geographic location. The poorest people are rural women living in the former Bantustans. Unemployment is structural. Under the expanded definition, which includes those who have given up looking for jobs, it stands at 46 percent (Statistics South Africa 2021b).

The MEC is now fragmenting. It may yet reinvent itself around platinum and renewables, but, in its traditional form, it is already exhausted, regardless of climate change. It nevertheless threatens to leave a legacy of a dead-end path dependency, with people immiserated in a toxic and rapidly heating land. The contours are already visible and were highlighted by COVID-19:

- Shrinking enclaves of wealth linked to a global order which retains—at least for now—the power to command the flow of resources from polluted and conflicted sites of extraction such as in South Africa, through unregulated exploitative and dirty manufacturing largely monopolised in China and East Asia, before arriving in the sparkling halls of elite consumption.
- An ever-growing sea of poverty, including whole sections of the middle class as they fall from the zones of relative privilege (see Spaull et al. 2020).

A just transition must transform people's relationship to each other and to the earth. To be just, it must lead to an egalitarian society and to ecological regeneration. An old slogan has it that there will be no peace without justice. This remains true. We should add that there will be no sustainability without environmental justice. The elite's ongoing degradation of the basis of life will lead to the uneven collapse of

The minerals-energy complex threatens to leave a legacy of a dead-end path dependency, with people immiserated in a toxic and rapidly heating land.

the present world order, first in the impoverished zones of extraction but finally in the metropolitan core. The poor in all countries will bear the brunt, but the rich will follow them on the sorrowing road to death sooner than they think.

UNREALISTIC ELITE SOLUTIONS

Solutions advocated by governments and corporations remain stubbornly unrealistic and grossly inadequate. In the last year, big oil and power utilities—including some that funded mendacious climate denial over the last four decades—have lined up to pledge ‘net zero’ targets. Most rely on ‘natural climate solutions’—a perverse version of the restoration of ecological systems that absorb carbon. This strategy is not viable. It relies on trading—or offsetting—carbon emissions from burning fossil fuels extracted from below ground with above-ground carbon that is exchanged between land, sea and atmosphere in the natural carbon cycle (Skelton et al. 2020). The fossil fuel emissions are certain; the long-term absorption of carbon on land is highly uncertain. Besides, nature’s ‘net’ is not big enough to absorb all the carbon that these promises imply. Shell alone would need to forest an area the size of Spain by 2050 (Kusnetz 2020). Done properly, restoring the earth is vital to adaptation, but, as a carbon sink, it compensates only for past ‘land use change’—that is, the destruction of forests, wetlands, grasslands and all. Beyond that is the question of whose land will be taken to offset corporate emissions. Carbon markets have been stuttering along since the mid-2000s, with zero impact on emissions. But they added impetus to the land grabs in southern countries, where the rights of peasants, pastoralists and forest dwellers are expropriated in the name of ‘sustainable development’ (Sovacool 2021).

Adaptation cannot be divorced from mitigation for several reasons. First, without serious mitigation, adaptation will be overwhelmed. This implies not that the one can be traded against the other but that there must be a holistic embrace of both. Second, climate change is but one dimension of global environmental change threatening economies and people’s livelihoods. Heavy pollution, chemical intensification, the accelerating loss of biodiversity and the ruin of land, fresh water, the oceans and the cryosphere make people and their environments more vulnerable to climate change.

A PEOPLE’S AGENDA

The Life after Coal campaign has put forward an open agenda for a just transition based on discussions with and within communities affected by fossil fuels (Life after Coal n.d.). In it, the ‘co-benefits’ of mitigation and adaptation are strikingly evident.

Taking the economic foot off the fossil fuel pedal would start a process of detoxing the world. The health impacts are felt most intensely by workers and communities bordering polluting mines, power plants, refineries and industries, and extend downwind and downstream to the major centres of population. Between 2,200 and 2,700 premature deaths, including 200 children, are attributable just to Eskom’s coal-burning power stations every year (Myllyvirta 2014, 14). Tens of thousands more people are afflicted with asthma and bronchitis. Thousands are, or should be, admitted to hospital. Many more suffer ‘restricted activity days’—days when they cannot function normally—and every year about a million working days are lost (Holland 2017b, 15). The toll from Sasol’s egregious pollution, from the oil refineries and from dozens of metal smelters, adds more death and disease.

In South Africa’s dual and unequal health system, who gets care and who does not mostly comes down to who has medical aid and access to privatised health care. The burden of care is then typically left to women, who may themselves be battling for breath. And they must balance money for asthma pumps against food and other household needs.

People whose health is compromised by pollution and poor nutrition have diminished capacity to adapt to climate change—itself the greatest public health threat of this century (Watts et al. 2015). Heatwaves, droughts, wildfires and floods have an immediate impact on people—causing death, injury and disability—as well as longer-term impacts on nutrition, respiratory and cardiovascular systems, mental health and people’s ability to work. Climate change will also bring heightened threats of infectious and



vector-borne disease such as malaria. That includes pandemics such as COVID-19 because climate change and biodiversity and habitat loss have common drivers and are mutually reinforcing. The public health system should take a central role in supporting people's capacity to adapt. However, it currently has no real response to the well-known health impacts of bad air: even in declared air quality priority areas, it has not dedicated resources to addressing these impacts and does not even collect relevant statistics. It is similarly without direction in addressing climate change.

The health of natural ecosystems is similarly impacted by burning fossil fuels. The acidification of soils, evident in the fertile grasslands of the Highveld and in the highly diverse Limpopo bushveld, is not reversible on a human time scale. The plume of pollution from the inland plants sweeps out across KwaZulu-Natal and Mozambique to the sea, where it adds to acidification driven by the absorption of carbon dioxide. It also carries mercury. Globally, coal burning is a prime source for this most toxic of metals that bio-accumulates up the marine food chain till it lands on people's plate (UNEP 2019).

Spontaneous combustion at coal mines releases unmitigated pollution—including an exotic range of sulphur compounds laced with heavy metals and an extraordinary cocktail of toxic hydrocarbons (Pone et al. 2007)—and far more greenhouse gases than previously thought. Similarly, coal mine methane emissions have been substantially overlooked and add massively to the carbon count for mining, particularly over the ever-more-critical short term in which the survival of peoples will be decided (Jones 2019).

The ruin of the land itself is immense in scale. Underground mines tend to collapse in time and result in subsidence at the surface and the fracturing of geological strata in between. Open cast miners simply blast and dig out the earth, 30 or 50 metres deep to get to the coal seam, piling it into heaps of what they call 'spoil'. The ruin of water follows from the disruption of groundwater flows, from direct pollution and from acid mine drainage. Four major rivers rise on the Highveld. Starting with the upper Olifants, these catchments are at risk of turning into a wasteland (McCarthy and Pretorius 2009).

The first imperative for adaptation is to stop digging coal. Rehabilitation is mostly poorly done if not entirely neglected. Even when well done, it does not return the land to anything close to its original state. Nevertheless, it remains essential both to eliminate emissions and to remediate or contain acid mine drainage. And rehabilitation needs to go beyond individual mines to restore wetlands and whole catchments. Hence, the rehabilitation of each mine must be understood in the wider ecological context and con-

tribute to the restoration of the whole. Fibrous plants, such as hemp, may be used to detox mine-contaminated lands and thereafter to produce alternative construction materials to substitute for carbon-intensive cement, to produce insulation for buildings and to substitute for plastics.

The townships and shack settlements that are mostly home to Black people are designed for neither adaptation nor energy conservation. Most are in a bad way. On the coal-fields, people's houses are cracked from mine blasting and often badly made and badly insulated, leaving people hot in summer and cold in winter. Roads are potholed, drains are blocked, rubbish overflows skips or collects on corners, sewage runs down the road, electricity outages are more common than not and water pipes are empty or leaking. Minimal provision is made for walking or cycling, and amenities and employment are often remote.

People's settlements need reconstructing in anticipation of the intensified storms and droughts that climate change will bring and with full participation of the people in conception, design, landscaping and construction work. Municipalities must restore services and work with people to create livelihoods concerned with the recreation and maintenance of social well-being. New housing must be energy-efficient; existing housing must be repaired and retrofitted and shack settlements upgraded. Housing should also be supplied with solar water heaters with servicing after installation, and local, community-owned photovoltaic mini-grids should be developed.

For a holistic climate response, reconstruction must also address the built infrastructure of roads, wires, pipes, drains, sewers and water storage, the soft infrastructure of terracing, storm-water soaks and street planting, and the natural infrastructure of catchments, streams and wetlands. It is urgent that the leaking sewerage plants now fouling our rivers be repaired or replaced with biogas plants where replacement is necessary.

The South African Waste Pickers Association advocates for 'zero waste'. Plastic is derived from fossil fuels and seen by Big Oil as a growing source of profits to compensate for any decline in revenues from fuel. But it already saturates the environment: microplastics, with accumulated toxins, are now detected in almost all living organisms. Zero waste starts with product design, eliminating the manufacture of redundancy and min-

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imising waste. Recycling then may substitute for virgin production. At the street level, separation at source facilitates recycling and removes wet waste from dumps, where it produces landfill gas instead of useable biogas and compost.

The capital-, energy- and chemical-intensive food system has failed the majority of South Africans. Hunger stalks the land; stunting affects 25 percent of children, and women bear the burden of providing on less than a shoestring while eating last. For people who live near mines and industry, the experience of COVID confirmed the necessity of people's food sovereignty and agroecology for healthy food and for restoring soil carbon. This must be accompanied by the redistribution of land and water rights.

JUST TRANSITION CENTRES

To support a people's agenda, we propose the establishment of a network of just transition centres (JTCs) beholden to local communities. They would have three primary aims:

- To support communities and workers taking the central role in the transition through democratic participation, including open access to information and decision-making and enhanced capacity to hold government to account.
- To connect community and expert knowledge across relevant fields—such as urban design, environmental health, agroecology, wetland and mine rehabilitation, and work and livelihoods—and enable community action across the range of the open agenda, including through the community's own initiatives to take control of its living and working environments.
- To engage with community groups and workers to monitor and document the impact on people of climate change and of the transition.

These aims would be supported by three programmes: open democracy, remaking people's lived environments and monitoring the transition. For all programmes, the JTC would

- compile a database of relevant experts;
- build a resource library for community use;
- organise community exchanges and community-expert exchanges and roundtables;
- assist communities in organising their strategies, responses and actions;
- provide workspace for expert field visits and for community research; and
- identify resources and agencies to carry out the various elements of the open agenda for a just transition.

A just transition is about people as community and as workers. It is twinned with the idea of open democracy, of people participating in the decisions that shape their lives, with full access to information and decision-making at all levels, and holding government to account for its deployment of the people's resources. At present, people are alienated from decision-making and have very little trust in government—or in many other institutions supposed to represent their interests. They see government as beholden to, or the vehicle of, private interests. A truly democratic transformation does not end with accountability. 'The economy'—a set of institutional relationships—has subordinated both society and nature to its narrow and elitist needs. A just transition that puts people before profits must ultimately be driven by the people.



OUR PEOPLE



Labour Market Shifts and Collective Bargaining in the Just Transition

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Climate change is no longer perceived as a peripheral environmental issue in domestic and global policy discussions. The adverse socioeconomic and ecological impacts of climate shocks are well documented, especially in the global South. Governments, private sector organisations, trade unions and other civil society groups acknowledge that climate change should feature prominently in political economy policy negotiations. Deliberations on economy-wide structural reforms thus include climate change-related mitigation and adaptation strategies. A prominent policy proposition in these discussions is expanding the use of technologies supporting climate change mitigation policies in countries. The technologies will produce positive socioeconomic and ecological policy outcomes in the long run. However, it is equally important to acknowledge that increased uptake of AI-driven digital and low-carbon technologies will exacerbate the long-standing structural challenges facing worker organisations and collective bargaining

structures used to represent employee interests. We aim to explore this theme in just transition public policy debates and develop some policy insights for worker organisations, government regulators and business stakeholders. Two core questions inform our interests in this area: What worker organising strategies are required to adapt to low-carbon economic restructuring? and How will the just transition impact worker representation and collective bargaining structures? These questions are inherently linked because trade union organising strategies have a significant impact on collective bargaining institutions. They determine the categories of worker representation and which socioeconomic issues are prioritised when engaging employers.

The first part of the essay addresses worker organising and advocacy strategies, while the second focuses on collective bargaining and its connections to industrial relations. Our aim is to provide a generic framework covering these two areas in the context of labour market and industrial relations shifts in a just transition. We primarily aim to set out some essential just transition guidelines and not a detailed prescriptive list of policy recommendations. These guidelines focus on workers and the labour movement, yet government authorities and employer organisations need to deliberate on the guidelines because collective bargaining affects all three social partners. The proposed guidelines highlight the centrality of managing disruptive labour market shifts and subsequent impacts on collective bargaining equitably, with an emphasis on inclusive worker organising and collective bargaining practices.

WORKER ORGANISING

Khwezi Mabasa and Crispin Chinguno (2018) argue that worker organising strategies cannot be separated from fundamental structural changes in sectors across the economy. These structural shifts impact wages, social security benefits, employment contracts and overall industrial relations. Thus, trade union organising in the context of just transition economic restructuring requires evidence-based analysis of the intersecting relationship linking sector production changes, trade union recruitment, organising practices and worker representation (COSATU 2012). A practical starting point is using case study literature and policy evidence on emerging technologies shaping South Africa's low-carbon economy to understand employment patterns across value chains. Several reports discuss data on existing and future labour dynamics in the country's renewable energy sector (Bischof-Niemz and Creamer 2019; Department of Energy 2021). Other sources highlight employment trends in a hydrogen economy driven by Platinum Group Metals, an economy early in its production and innovation life cycle (Creamer Media

2021; MISTRA 2020). For example, the Independent Power Producers note that South Africa's Renewable Independent Power Producers Procurement Programme created 59,071 employment opportunities by 2021 (measured in job years) (Department of Energy 2021). MISTRA (2020) reports on the implementation of several hydrogen economy pilot projects in mining, energy, construction and automotive sectors. These projects illustrate that employment creation and skills development can expand rapidly in a low-carbon economy transition if supported with adequate policy measures aimed at producing socioeconomic multiplier effects. In addition, the findings identify building local value chains, increasing low-carbon energy demand and domestic manufacturing as critical to job creation in a just transition.

What is missing in these accounts are the lived experiences of South Africans who have accessed employment opportunities in these emerging sectors, especially workers in low-skill occupations and targeted community beneficiaries. Worker organisers need support in developing training, negotiation and policy education capabilities to map employment dynamics in these nascent sectors holistically. This includes examining wage trends, the nature of employment contracts, working conditions and union density. Trade union education, sector specific policy training and learning from workers' experiential narratives are crucial factors in this process (Deedat 2018). The combination of researched evidence and learning from worker's lived experiences lays a solid basis for developing adaptive organising strategies that are anchored in 'decent work' labour market policy frameworks. The groundwork has been established in South Africa's trade union movement advocacy through worker-affiliated policy training and research institutes, such as the National Labour and Economic Development Institute (NALEDI). It needs to be developed further by using sector-specific worker surveys, experiential learning and dedicated support programmes for worker organisers.

An additional dimension of worker organising in a just transition context is linking labour market and social policy interventions. Changes in the production structure of economies always produce positive and adverse socioeconomic externalities. One of the major concerns in the South African context is the potential loss of employment and livelihoods as a result of various low-carbon and digital economy policy interventions. The trade union movement is currently deliberating several policy propositions that can ameliorate negative labour market and livelihood impacts. Several policy solutions connecting labour market and social policy advocacy in a just transition deserve attention. A universal basic income grant is one example, since it can provide transitional social security for displaced workers and create a 'safety net for communities hard hit by

One of the major concerns in the South African context is the potential loss of employment and livelihoods as a result of various low-carbon and digital economy policy interventions. The trade union movement is currently deliberating several policy propositions that can ameliorate negative labour market and livelihood impacts.

the varied and cumulative effects of climate shocks' (Marais 2018). This social transfer can be complemented by other social policy interventions, such as improved access to skills training suited for future wage employment or alternative livelihood pathways in a low-carbon economy. The latter includes non-wage alternatives, such as worker cooperatives and community-owned enterprises.

Lastly, trade union organising and worker representation in a just transition must protect the socioeconomic rights of different categories of workers. The transition towards a low-carbon economy will deepen existing labour market disparities if not managed equitably. Several sources illuminate the extensive labour fragmentation produced by structural changes in labour markets over the last three decades. A significant trend is the expansion of atypical employment, which is markedly different from standard employment relationships (Buhlungu 2010). Atypical work undermines decent-work labour frameworks because it leads to decreased employment security, low incomes and minimal access to social security and collective bargaining (Chinguno 2015; Dickinson 2021). NALEDI's (2015) survey-based report highlights that workers in non-standard employment have significantly less access to trade union representation and contend with more exploitation than their counterparts.

An additional area overlooked in just transition labour market policy debates is the role of informal workers. These workers play a significant role in waste management, recycling and other sectors which contribute to the low-carbon economy. Yet their socioeconomic rights and roles in the emerging low-carbon economy are marginalised. Recent conservative estimates suggest that South Africa's informal sector employs close to 3 million people, mainly in retail, construction, social services and transport. It is essential to include this category of workers when deliberating on future labour market

policies in a low-carbon economy. The points on inclusive labour market structures illuminate the overall proposition for adaptive changes in worker organising strategies and collective bargaining, which protect different categories of workers in pursuit of decent work. We explore this theme further in the next section.

RETHINKING COLLECTIVE BARGAINING

Collective bargaining and social dialogue are essential components for decent work, industrial relations stability, labour protection and enhanced welfare benefits for workers (Mokofe 2020). The transition of workers to a low-carbon economy will require strengthened collective bargaining institutions and social dialogue to ensure that at-risk workers materially benefit from a just transition. Labour market shifts in a just transition towards a low-carbon economy necessitate coordination and integration between environmental legislation (which prioritises decarbonisation, i.e., the climate change bill) and employment legislation (which prioritises labour standards and wages, i.e., the Labour Relations Act and Basic Conditions of Employment Act). Industrial relations institutions have the institutional capacity to deconstruct the trade-offs between workers and the environment, empowering workers' capacity to respond to long-standing environmental standards.

The Italian experience provides a case study in which industrial relations institutions such as trade unions and employer associations have prioritised a decarbonisation agenda, with the incorporation of environmental sustainability in industrialisation observed for the past two decades. The results have been mixed across sectors, regions and firms because of regional variables and other constraints over and above the policy positions of unions or employer associations. Since the early 2000s many firms in Italy have undergone structural transformation to convert from fossil fuel energy to renewable energy production. In some cases, the transformation has been successful, with limited negative socioeconomic impacts on workers and communities, while in others the negative impact on jobs and the communities has been significant. Substantive trade union and community organisation participation in decarbonisation processes has been identified as a key component in reducing the adverse socioeconomic impacts of decarbonisation. Participation has been driven by convergent forces, namely, the escalation of the climate crises and the adoption of binding climate agreements at the UN and EU levels, as well as the need to respond to Italy's National Energy Strategy, which will result in a transition from coal by many companies (Tomassetti 2021).



Labour market shifts produced in the low-carbon economy transition could cause industrial relations conflict. South Africa's labour market responses to previous economic structural shifts have not been favourable to workers, with a rise in atypical employment and other forms of short-time work in the past three decades. Paul Benjamin (2010) laments strategies adopted by South African employers to limit workers' labour law protections through the adoption of short-time contracts, independent contracting and labour broking. These strategies create indirect non-conventional employee-employer relationships that subvert labour legislation and minimise access to trade union representation. Several sector case studies illustrate how industrial relations conflict increases when trade union organising and collective bargaining structures fail to adapt to structural changes in the economy. Platinum belt mining and the South African Post Office are two key examples (Chinguno 2015; Dickinson 2021).

A consensus position on the centrality of collective bargaining in managing economic restructuring equitably is beginning to emerge. However, declining union density has the potential to weaken collective bargaining. In the context of declining trade union density, John Kelly (2015) calls for an alternative collective bargaining practice, one that shifts from the conventional thinking of institutionalised bargaining towards inclusive worker mobilisation that builds capacity to strengthen diverse employee representation. The mobilisation theory explains that for workers to act collectively they must believe that their current working conditions are unjust, share a similar grievance with fellow workers, agree that the employer is responsible to address the grievance and pursue collective agency to address the collective grievance. With the impact of climate crises on water supply, food prices and workers' purchasing power, workers are more likely to organise and create the needed agency to mobilise collectively, as Kelly suggests.

The principle of extending collective bargaining agreements to non-unionised workers is beginning to gain traction in industrial relations (García Calavia and Rigby 2020). The European Union has been able to extend collective agreements to non-unionised workers and informal sector workers. Thorsten Schulten and colleagues (2015) identify two approaches to extend collective agreements to non-parties. The first involves the extension of collective bargaining agreements to non-unionised workers in companies affiliated with the employers association negotiating an agreement, with the aim of preventing companies from discriminating between organised and non-organised workers. The second approach would extend collective bargaining to non-affiliated companies; this is usually done through declarations of general application and amendment to legislation which will apply to all firms.

The second approach is desirable to address the labour rights of informal and formal atypical workers in the just transition. Workers in non-standard employment are unlikely to benefit from standard collective bargaining, even in its extended form. Françoise Carré and colleagues (2020) articulate the barriers to entry for informal workers and highlight the importance of legal frameworks to provide a sense of bargaining power. The best example of such a legal framework is the promulgation of the National Minimum Wage (NMW) Act after considering proposals from the Congress of South African Trade Unions and other trade union federations in the National Economic Development and Labour Council. The NMW legislation was particularly important for reducing the poverty levels and vulnerability of farm and domestic workers. The promulgation of the NMW illustrates how inclusive approaches to worker representation and rights advocacy can reduce the exploitation of workers who are not parties to a collective bargaining structure. This principle should be equally applied in a just transition context, emphasising a transition legal framework which connects labour and environmental laws aimed at creating decent jobs, environmental sustainability and stable industrial relations. A just transition to a low-carbon economy hinges on the ability to develop adequate regulatory measures that address market failures and externalities that accompany economic restructuring processes.

Collective bargaining has secured decent work and a healthy working environment for employees over the years. The just transition will only be realised through the explicit integration of labour and environmental protection through collective bargaining and social partnerships (Tomassetti 2020). The extension of collective bargaining will ensure greater coverage of workers regardless of their type of employment or worker organisation affiliation. However, collective bargaining in a just transition will only

ensure the needs of the employer (or capital) and labour; other mechanisms must be explored to ensure a just transition for communities affected by a transition to a low-carbon economy.

Trade unions must adopt proactive just transition strategies for the future. As Béla Galgóczi (2018) observes, this can be achieved through strategies developed by trade unions to drive the just transition agenda. Labour market transitions, social and labour plans and pathway management to decent jobs are essential components of the strategies that trade unions must develop.

CONCLUSION

This essay has developed some primary guidelines for managing low-carbon economy structural changes equitably, focusing specifically on inclusive trade union and worker organising and collective bargaining strategies. Historic economic restructuring experiences in South Africa have produced industrial relations conflict, labour market disparities and socioeconomic exclusion. We have posited interventions to avoid this path dependency in the emerging low-carbon economy, drawing from literature and surveys on worker experiences. Trade union organising and collective bargaining structures are essential factors in coordinating and managing the transition towards a just low-carbon future. Both these practices must be inclusive to lessen socioeconomic exclusion and long-standing labour market disparities. This necessitates interventions that emphasise coordination of the labour market with social and environmental policy. Additionally, it is imperative to obtain and study labour market lessons from the existing low-carbon technologies being introduced in South Africa. An active labour market response cannot be developed without learning from worker experience in emerging sectors.

The just transition will only be realised through the explicit integration of labour and environmental protection through collective bargaining and social partnerships.



Shaping Ecosystem-Based and Community-Based Adaptation Policies and Programmes to Effectively Incorporate Empowerment of Women

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THE CHALLENGE

Interactions between social and ecological systems are at the centre of climate change adaptation. Community-based adaptation (CBA) aims to reduce the risks of climate change by involving communities themselves in the practices and planning of climate change adaptation. Ecosystem-based adaptation (EbA) is the inclusion of biodiversity and ecosystem services as part of an adaptation strategy to adapt to the adverse effects of climate change. Effective EbA and CBA require the participation of many different

stakeholders. A challenge in this respect is the marked difference between women and men in the use and governance of natural ecosystems, particularly in rural areas under traditional and customary land tenure systems in South Africa.

The patriarchal systems that characterise communities under traditional leadership in provinces such as KwaZulu-Natal, Eastern Cape, Mpumalanga and Limpopo typically result in decision-making that is dominated by men. As primary users of natural resources, and those often most affected by environmental degradation, women have a key role to play in management and decision-making, yet they often remain largely passive or excluded. The effectiveness of land and natural resource use management is weakened by the lack of participation by women. This has implications for CBA as an approach to devolve decision-making to the community level, and CBA is not sufficient to ensure that women can meaningfully engage in the participatory process and decisions, particularly relating to EbA.

This essay highlights the need to harmonise culture and tradition with gender equity goals in the governance of ecosystems and natural resources, and to develop a deeper understanding of the importance of empowering women to enhance adaptive capacity.

GENDER EQUITY POLICY FRAMEWORK

Gender equity is enshrined in several international declarations and conventions to which South Africa is a signatory, including the UN Universal Declaration of Human Rights and the Convention on the Elimination of All Forms of Discrimination against Women. South Africa's policy and legal framework on gender equity reflects these, the foremost example being the South African Constitution. More specifically, South Africa's policy on gender and women's rights is outlined in the Women Empowerment and Gender Equality Bill and the National Policy Framework for Women's Empowerment and Gender Equality.

The Environment Sector Framework for Women Empowerment and Gender Equality and the Strategy toward Gender Mainstreaming in the Environment Sector aim to promote a gender-sensitive management approach in the environment sector (DEA 2016). The National Environmental Management Act recognises the critical role of women in environmental management and development and advocates for the participation of women. However, few women are involved in decision-making regarding programmes to create sustainable and safe environments for economic development, particularly in rural areas (DEA 2016).

The South African Constitution recognises and provides specifically for the protection of culture. South Africans have a right to culture and to practice customary law. However, these rights are not unlimited. Traditional leadership institutions are subject to the other rights enshrined in the constitution. For example, the Traditional Leadership and Governance Framework recognises the important role of traditional leaders but specifically stipulates that gender equity within the institution of traditional leadership must be advanced.

REPRESENTATION VERSUS PARTICIPATION

While gender equity is enshrined in South Africa's policy framework, implementation is lagging. Disparity between men and women is clearly still evident in land ownership and access to financial capital. Women make up 51 percent of the population, yet they own less than 15 percent of land (Parliament of the Republic of South Africa 2018). Two-thirds of investors in informal saving schemes are women (Statistics South Africa 2017), underscoring the lack of access to formal capital.

Gender inequity results from a combination of interrelated aspects and is closely linked with other modes of discrimination and sustainable development challenges. However, the prevalence of patriarchal systems at the household, community and institutional levels is a driver of gender inequity in rural South Africa.¹ As Relebohile Moletsane and Sithabile Ntombela (2010, 4) explain, 'Boys and girls growing up, and men and women living in these rural settings, are socialised to fulfil different social roles and to live in accordance with gendered expectations, norms and values. It is within rural households that the cultural constructions of gender take place, entrenching the subordinate position of women and girls in these contexts. . . . Although they fulfil critical socio-economic roles, women remain poorer, invisible and voiceless, and are excluded from decision-making processes'. These gendered expectations extend to the community and institutional levels. Traditional leadership institutions and customary laws are characterised by an entrenched patriarchal system where women typically have limited access to political power and are prohibited from 'owning' land or excluded from decision-making on land use (Perumal 2010).

Anecdotal observations suggest that women's participation in traditional decision-making systems and structures remains constrained. The entrenched nature of patriarchal systems at the household and community level continues to influence how women themselves choose to participate. Even if formally included as 'members' of a deci-



sion-making structure, women may choose not to participate actively as they feel it to be contrary to their culture or against the wishes of the male participants. The recognition of the right to culture, and inequity where traditional systems are largely patriarchal, creates the potential for tension between traditional practices and the realisation of the equitable empowerment of women. Such tensions pose a challenge to the development of effective climate change adaptation capacity.

WOMEN AND CLIMATE VULNERABILITY

Climate change is putting stress on practically all ecosystems and natural resources and exacerbating environmental degradation, making natural resources increasingly scarce or more expensive to source. Rural households, particularly those living in poverty, depend on natural resources for their well-being. Natural resource loss, ecosystem degradation and climate change all have gender dimensions. Climate change impacts in southern Africa are recognised to be driving changes such as reduced water availability, loss of agricultural productivity and degradation and scarcity of natural resources harvested for domestic needs. These impacts are especially linked to the care work carried out by women in rural households (ECLAC 2021). Studies have shown that women disproportionately suffer the impacts of climate change because of inequity associated with cultural norms, and the inequitable distribution of roles, resources and power (Yavinsky 2012). Fanelesibonge Masinga et al. (2021) demonstrate that women in rural communities in KwaZulu-Natal are ill-equipped to deal with the uncertainty brought about by climate change and do not know how to cope with drought. Faced with shrinking crop yields, many women are abandoning their subsistence agriculture and turning to harvesting natural resources to try to meet household food security needs. For example, they are chopping down trees and other natural resources to make products they can sell

to generate income that can then be used to buy food. While women can earn income from them, these activities perpetuate their vulnerability that is linked to degradation and scarcity of natural resources.

WOMEN AND ECOSYSTEMS-BASED ADAPTATION

EbA has emerged as a key approach to addressing the impacts of climate change by reducing people's vulnerability while also building the resilience of ecosystems. Given the different roles and responsibilities of men and women in natural resource management, gender considerations are important to the success of EbA (GIZ 2021). Women play a unique role in the stewardship of natural resources, and with their knowledge they can help to develop strategies to adapt to climate-related risks (UNDP 2010). At the local level where EbA actions are typically implemented, however, research has found only limited evidence of EbA initiatives that systematically take a gender-responsive approach. Few EbA initiatives appear to go beyond gender sensitivity to address inequity and to increase meaningful participation of women in decision-making related to EbA (Cook et al. 2019; GIZ 2021). Among the issues that must be taken into consideration in a gender-responsive EbA approach are the following:

- Recognition of differences between women and men in their adaptation needs and capacities
- Gendered roles and responsibilities and differences in access to, and control over, natural resources (gender-specific knowledge)
- Gender-equitable participation and influence in adaptation decision-making processes
- Gender-equitable access to finance and other benefits resulting from investments in adaptation (GIZ 2021)

Anecdotal evidence has highlighted that another aspect requiring consideration is how changing perceptions of the value of ecosystems and natural resources influence decision-making powers. For example, in a community under traditional leadership in northeastern Limpopo, where governance of natural resources and land use is the domain of men, decisions regarding the use of a large wetland have been 'left' to the women who are using it for subsistence crop cultivation. In this case, the wetland is seen

Few ecosystem-based adaptation initiatives appear to go beyond gender sensitivity to address inequity and to increase meaningful participation of women in decision-making related to EbA.

as having no value other than for crop production. However, current systemic inequities could allow men to 'take back' power if they become more aware of the wetland's importance in EbA.

WOMEN AND COMMUNITY-BASED ADAPTATION

Limited access to resources, restricted rights, reduced mobility and a limited voice in both community and household decision-making make women more vulnerable than men to the effects of climate change. This can have negative consequences, as women play a unique role in the stewardship of a range of natural resources in their communities. With their knowledge, they have an important contribution to make to developing adaptation interventions. It is therefore essential that CBA activities reflect women's and men's different needs, perspectives and knowledge (UNDP 2010). The inclusion and active participation of women in CBA guarantees that their valuable knowledge and skills are not excluded.

The CBA approach of devolving decision-making to the community level is insufficient to ensure that women can meaningfully engage in the process. There can be different levels of participation in community decision-making, ranging from nominal and passive participation to active and substantive participation. Evidence suggests that women's social capital and networks, and community-level recognition of women's roles, are instrumental factors in encouraging empowered participation by women (Patnaik 2021).

One prerequisite for effective CBA is integrating gender into participatory analysis of local climate vulnerability; another is integrating gender into adaptive management to ensure that it informs design, monitoring, evaluation and learning (CARE 2015). CBA approaches also need to be strengthened to ensure that women can voice their perspectives, share their knowledge and become empowered to effectively participate in decision-making, and that men recognise the knowledge and contribution of women.

Anecdotal evidence has shown that equitable representation of women in forums or decision-making structures does not necessarily lead to effective participation. For example, a number of rural communities in the Capricorn District, in Limpopo Province, have received support from nongovernmental organisations through a programme to develop EbA and build resilience to the impacts of climate change. A decision-making committee was established comprising nominated representatives, including at least 30 percent women. Despite continuous capacity development, however, the committee's decision-making remains dominated by the men, and women are largely passive. Even when the women participate in discussions, decisions are still ultimately made by the men, and the women accept this. Representation only has limited effectiveness in empowering women, who still do not feel sanctioned to actively participate in decision-making processes.

CONCLUSIONS AND RECOMMENDATIONS

Cultural and social norms that are imposed on women in patriarchal societies have made gender inequity in natural resource management, EbA and CBA broadly acceptable, both to decision-makers and often to women themselves. Participatory and devolved approaches, such as CBA, do not guarantee inclusive decision-making. The power dynamics between men and women remain, meaning that community participation is not sufficient to ensure that women meaningfully engage in participatory processes or, if they do participate, that their views and needs are incorporated into the decisions made. Even where women are represented in decision-making structures, they are often token or passive participants. In such cases, decision-making cannot be said to incorporate equitable participation by women and risks being driven by gendered interests. It is increasingly recognised that climate change differentially impacts the lives and livelihoods of men and women. This makes women's knowledge and experiences essential for successful EbA and CBA approaches.

It is increasingly recognised that climate change differentially impacts the lives and livelihoods of men and women. This makes women's knowledge and experiences essential for successful EbA and CBA approaches.

There is an urgent need for an integrated and multidimensional approach that supports the mainstreaming of a gender perspective into climate change adaptation and natural resource governance. Gender inequity can no longer be rationalised by cultural systems based on patriarchal values. New systems must reflect a transition to the constitutional value of human dignity, equity and freedom.

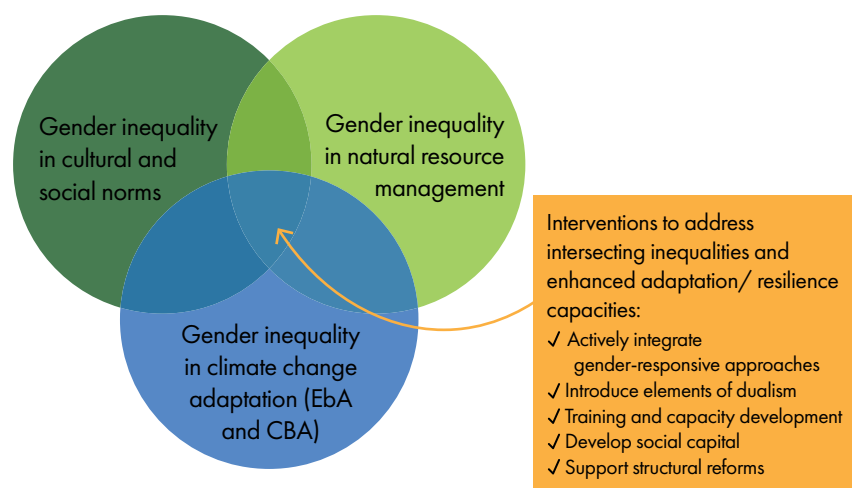
In South Africa, despite the widely recognised vulnerability of rural women to the impacts of climate change and increasing awareness about the need to mainstream gender into EbA and CBA, there is a dearth of research and applied interventions that address the climate change adaptation challenges for women, and of strategies to empower women to participate in EbA and CBA more effectively (Masinga et al. 2021).

Factors that are recognised as contributing to a shift in power relations between women and men, as observed in several rural settlements in South Africa, include for example the presence of institutions that acknowledge and recognise women's concerns, changes made to customary law making it easier for women to access and own land, knowledge of the law, awareness-raising workshops and campaigns (for both women and men), and access to education (Babugura 2010).

Drawing from current knowledge and experience locally and globally, we offer several recommendations for consideration by policymakers and implementers to address the intersecting dimensions of gender inequity and facilitate a transition to equitable gender-responsive approaches to climate change adaptation in South Africa (Figure 1). Exploration, through implementation, of these approaches in the rural South African context is urgently needed to refine the most suitable strategies.

1. *Actively integrate gender-responsive approaches into EbA and CBA:* EbA and CBA approaches need to evolve beyond token representation of women to being inclusive and equitable, and they must address gender balance by empowering women to meaningfully participate in decision-making at all levels. This requires the commitment of adequate time and resources to ensure that the necessary interventions are effectively implemented.
2. *Introduce elements of dualism:* An approach of dualism to community participation in climate change adaptation decision-making recognises that the current 'reality' consists of two irreducible elements. Dualism offers options to harmonise culture and tradition with requirements for gender equity by, for example, facilitating separate focus groups for women and men for them to contribute gender-specific knowledge to planning and decision-making processes. This approach encourages

Figure 1 • **Interventions Addressing Intersecting Dimensions of Gender Inequity to Enhance Adaptation Capacities**



women's active participation by recognising that women may have entrenched cultural barriers to participation in forums involving men and implements processes to accommodate this. These focus group meetings can be facilitated through existing women's organisations, or, if women's organisations do not already exist, support could be provided to create them. In several rural settlements of KwaZulu-Natal, for example, the presence of gender-specific forums was identified as contributing to a shift in gender-based power relations (Babugura 2010). Dualism, however, requires a good understanding of the local gender dynamics and intersecting inequalities. A sound contextual understanding is needed to ensure that gender dynamics are appropriately considered and applied.

3. *Develop social capital:* The risk of approaches based solely on dualism is that they perpetuate gender inequity relating to ongoing gender differentiation. However, strengthening the capacity of women to participate and to mobilise by establishing women's groups can facilitate longer-term development of social capital, which can increase and sustain women's participation. Collective solidarity and support within women's networks has been demonstrated to encourage women to participate more actively (Patnaik 2021). Women's collective empowerment and unity

allows them to increase their bargaining power within the community over time and facilitates their comfort in becoming involved in community settings. This creates options for mainstreaming women's participation in the long term.

4. *Develop capacity:* Tensions exist between the need to recognise gender equity and the right to cultural practices and customary law values. Systematic awareness-building and capacity development is needed to enable women to understand their rights, roles and responsibilities, and to enhance women's capacity to take up their rights and responsibilities as decision-makers. Capacity development is a means to facilitate a transformation towards gender equity by raising awareness and encouraging learning, knowledge-building and skills development. It helps women and men understand the role gender plays in their communities and to develop the capacity to advance gender equity in the management of their socio-ecological systems (UN Women n.d.). Capacity development can also include supporting women to organise themselves and to form associations. This facilitates development of social capital and collective action, which can contribute to, for example, systems for equitable sharing of benefits from the improved management of ecosystems. Capacity-building programs should include conflict resolution, assertiveness training and advocacy on gender issues.
5. *Support structural reforms:* Systemic inequalities within communities, such as inequitable structures, hierarchies and power relationships that underlie gender inequity, need to be reformed to support effective participation by women in decision-making. To encourage women to participate in making decisions more broadly, structural reforms are required in parallel to specific interventions relating to planning and decision-making for climate change adaptation. Long-term measures that institutionalise and embed women's equity in their communities need to be supported and encouraged, including for example property rights for women, economic empowerment and formalised capacity building for women and men as well as universal education. Investments in structural reforms will support sustainable changes in power relations between women and men and empower women's participation and development broadly. These sustainable changes in power relations in turn enhance the long-term adaptive capacity of communities.



Mental Health Considerations in a Just Transition to a Low-Carbon Economy

Rucksana Christian, clinical psychologist in private practice, member of the Psychological Society of South Africa (PSYSSA)



Psychoanalytically, we could read the story of climate change as a sibling rivalry between the global North and South in their relationship with Mother Earth. The northern sibling has set itself up as the more powerful child, omnipotent and aggressively attached to the mother. At the expense of the southern sibling, the North has dominated the system through acting out to exploitatively maintain and defend its own relevance, importance and adequacy. The North's domination also comes at the expense of the entire system. It affects the nurturing mother's health, while the overpowered southern offspring struggles with the mental and physical burden of impotence and negative self-identification, adding to Mother Earth's pain at her inability to control her more aggressive child. Having no alternative to protect the earthly family system from complete destruction, she gives stern, consequential warnings that demand more mature behaviour from both her children—warnings in the form of the intensifying ecological disasters of climate change.

Psychoanalysis, however, is not the most effective psychological framework to understand and practically address the challenges posed by adaptation to climate change. Psychosocial psychology, which asserts that the external context and the intrapsychic influence each other (Hook 2005), is more applicable. This framework is most relevant as it includes understanding the impact of the historical, as well as how the social, political and economic affect psychological and intrapsychic processes. Although likely to be resisted by practitioners following classical psychological approaches, in the context of climate adjustment, a psychosocial approach is the only one that can promote a just transition to climate change in a manner that accounts for individual and mental health challenges in their sociopolitical context.

Climate change ushers in a watershed moment in the history of humanity. It is a global, complex, systemic predicament that presents the world with associated health problems that are diverse and far-reaching (Inquiry and Dissemination Group 2021). Social, historical and political factors operating at different scales affect levels of vulnerability to environmental change (Thomas et al. 2018). The colonial exploitation of sub-Saharan Africa has resulted in this region's facing the challenges of climate change with particularly high levels of vulnerability (Barnwell 2021; Fernandes Jesus et al. 2020; Holland 2017a; Thomas et al. 2018). South Africa is not immune from the sociopolitical consequences of its history and enters the climate change quandary with vulnerabilities that are deeply entrenched socially, economically, politically and psychologically.

The psychological effects of apartheid have not been adequately researched and documented (Stevens et al. 2013). However, apartheid imprinted a negative racialised identity on the Black population and led to low levels of education, poor economic opportunities and poor social infrastructure. This has further impacted the health status of Black communities, including their mental health. Living under apartheid and its

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persistent continuities in contemporary society can be seen as a state of continuous traumatic stress (Jackson et al. 2010). Psychological distress in South Africans has its roots in the social, economic and political (Kagee and Price 1995). It has affected mental health, inter-group relations and issues of identity. Research suggests that race differences in psychological distress can be attributed to socioeconomic status, especially in relation to education and income (Jackson et al. 2010). Others have suggested that racial prejudice and discrimination worsen psychological distress (Jackson et al. 2010). The prevalence of mental illness in South Africa is high (Meyer et al. 2019). The country's health system has, however, been pitifully ineffective in providing care.

Socioeconomic vulnerability is a major contributing factor to the increasing incidence of mental illness. Half of South Africans currently live in poverty, and 44 percent are unemployed (Statistics South Africa 2021a). The poor live in areas with poor infrastructure and higher susceptibility to pollution, poor water access and water quality, poor sanitation, malnutrition and other risk factors. This means that the health consequences are greater for the poor (Ezzati et al. 2004). Low socioeconomic status and poverty are positively related with suicide (Bantjes et al. 2016). Low levels of education are also dominant in the country. Continued institutional failure to provide the necessary social and economic support makes adaptation to climate events significantly more difficult (Barnwell 2021). Low educational levels and grant dependency also add to the difficulty. These same factors make the population more vulnerable to psychological adversity and mental illness (Barnwell 2021; Fernandes Jesus et al. 2020). It is thus clear that the upfront investment necessary to respond to climate change could amplify South Africa's economic, infrastructural and therefore mental health challenges,

particularly psychological trauma and stress responses. If not managed effectively, the transition to a low-carbon economy is likely to be accompanied by a significant increase in mental illness.

Preparation for these changes offers an opportunity to alter the woeful state of mental health care and to utilise the complexity of the climate change challenge to begin to address mental health care in the context of broader social injustices.

CLIMATE CHANGE AND MENTAL HEALTH PERSPECTIVES

Mental health advocates in the United States, Canada, the United Kingdom and Australia have adopted the term 'climate anxiety' or 'eco-anxiety' to describe psychological responses to climate change (Andrews and Hoggett 2019). These responses can include fear, anxiety, loss, grief, despair and guilt (Inquiry and Dissemination Group 2021; Andrews and Hoggett 2019). Presented to the world from an individualistic and bio-medicalised cultural perspective, 'climate anxiety' undermines, and may even deny the need for, efforts to address climate injustice, which has its roots in the historical domination and exploitation of the global South by the North (Barnwell et al. 2020; Fernandes Jesus et al. 2020). It shifts discussion of climate change and climate justice into a sphere of elitism and exclusivity. This positioning risks excluding race and its social and political consequences from climate activism. Already broadly witnessed in the media, such exclusion is also manifest, for example, in the recent barring of a young Ugandan climate change activist from the World Economic Forum (Rafaely and Barnes 2020). The 'climate anxiety' focus also marginalises communities and individuals and denies the economic and social impact of racism. In addition, it further disempowers the process of adaptation to climate change (Fernandes Jesus et al. 2020). Instead, solutions

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to the effects of climate change are put in the hands of professional elites, at the expense of the voices of those most affected by climate change. The resulting strategies favour the community sectors with the means to more easily adapt.

Examination of the effects of climate change on mental health in the global South yields little information, given the lack of research on how the global South is engaging this issue (Barnwell 2021; Fernandes Jesus et al. 2020). Research on the topic in South Africa is similarly limited. Google searches on or related to climate anxiety or eco-anxiety in South Africa produced few results (Barnwell et al. 2020). If we assume that internet search results are an indicator of relevance, this suggests that the challenges or the distress experienced by populations in South Africa are dissimilar to those of populations in the global North (Barnwell et al. 2020). Local social movements that address mental health challenges exclusively in relation to climate change are rare. In a recent webinar on mental health and climate change, the African Climate Alliance (ACA) highlighted the continual marginalisation of Black communities, along with climate issues deepening the already prevalent inequality that these communities experience. The ACA's contributions affirm that the South African populace is more vulnerable to the mental health harms of climate change because these occur in the context of a Black majority already marginalised and carrying the burden of mental illness due to the trauma of injustice and the lack of infrastructure and resources (Fernandes Jesus et al. 2020).

The severe historical trauma of systemic violence and racial discrimination, as well as an internalised negative racialised Black identity (Stevens and Lockhat 1994), make South Africans more vulnerable to the expected impacts of climate change, including increased burden of disease, water and food insecurity, sun and heat exposure, energy crises, financial insecurity, interpersonal violence, natural disasters and mental health effects (Barnwell 2021). Increased depression, sadness, anger, helplessness, hopelessness, fatigue, inability to experience pleasure, loss of energy, feelings of worthlessness, anxiety,

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panic, restlessness, suicidal ideation and actual suicides (Andrews and Hoggett 2019; Barnwell 2021) are all likely to overwhelm the South African population and the existing support systems. Given that women, children and youth are among the South Africans most vulnerable to these mental health challenges (Barnwell 2021), the effects of climate change are potentially calamitous in increasing socioeconomic sustainability.

Addressing the mental health effects of climate change as independent of the broader sociopolitical and psychosocial South African context would effectively deny the reality experienced by the country's majority. It would likely lead to mental health interventions directed only at the best-resourced 25 percent of the estimated one-third of South Africans requiring mental health support, such as psychiatric consultation, medication, counselling, psychoeducation or psychotherapeutic treatment (Pillay 2019). Moreover, it could distract public attention from climate change realities, delay adaptation by leading to climate change denial and restrict the necessary contributions that all South Africans need to be aware of to contribute to a low-carbon economy.

Furthermore, the South African response to the COVID-19 pandemic illustrates the importance of engaging communities on issues of change. The pandemic response has exposed systemic failures that have further diminished the ability to access mental health treatment (Sodi et al. 2021). Anxiety about contracting COVID-19 has increased depressive symptoms, and studies of the first lockdown found that 33 percent of the population was depressed, 45 percent fearful and 29 percent acutely lonely (Nguse and Wasserman 2021). This experience reinforces the necessity for greater focus on understanding societies' lived realities to support mental health in a just transition responding to climate change.



CONSIDERATIONS IN DEVELOPING A FRAMEWORK FOR A JUST TRANSITION IN RESPONSE TO CLIMATE CHANGE

The mental health consequences of a just transition in response to climate change are clearly complex and multifaceted and beyond the scope of this essay. It is, however, imperative that efforts integrate the ideas below into framework development from the outset.

The sociopolitical dynamic is such that those who will be most affected by climate change have the least ability to bring about societal change. In the context of a post-apartheid South Africa that has been sorely disappointing in the delivery of a promised transformation that would benefit all its citizenry, the necessity of climate change adaptation offers an opportunity to re-engage transformation. A relevant societal transformation would need to be holistic and impact the provision of all services to the South African people, including mental health services. Thus, the conceptualisation of the climate adaptation process needs to be the ideological, conceptual and intellectual container within which the issues of mental health care are housed, and it is the first step in such a transition. Relevant transformation requires that all voices be heard and needs addressed. Inclusion of all South Africans, but particularly vulnerable communities at the earliest stages of engaging in a just transition in response to climate change, is necessary to provide a platform for expression of community need, to integrate this requirement into conceptualisation and planning, and to begin the mammoth task of redressing systemic inequality through climate change adaptation. Effective climate adaptation interventions must address systemic issues in their totality. This may challenge existing power relations and require the re-imagining of an entire social system.

Psychologically, the long-standing effects of race and class segregation and social inequality have caused social fragmentation. This has resulted in a disconnect between people: from each other, from themselves and from the social forces impacting their lives (Pavel 2015). This fragmentation, and the accompanying confusion, disempowers those who endeavour to bring about social change (Pavel 2015). Communities in metropolitan regions have largely been accepted as the sites through which collaboration for change will be most effective (Fernandes Jesus et al. 2020; Pavel 2015). However, if climate change response initiatives are to be successful, vulnerable communities need to be empowered to take control of the climate issues which affect mental health in their communities (Fernandes Jesus et al. 2020; Thomas et al. 2018). The factors above are

If climate change response initiatives are to be successful, vulnerable communities need to be empowered to take control of the climate issues which affect mental health in their communities.

significant for change in South Africa, where low educational levels are an important consideration in climate change adaptation. Adding to the complexity is the lack of information needed to understand a community's awareness of climate change and its impact on the community's environment. Thus, climate change intervention needs to consider the relevance of the issues to specific communities, along with the specific mental health challenges present in that location. Empowering communities by giving them the autonomy to identify, plan and respond to the particular sociopolitical issues which underlie their mental health is a just and sustainable way to address the transformation required for effective climate change adaptation (Fernandes Jesus et al. 2020).

Quantifying the extent of mental illness in South Africa is difficult and complex. There is also little local research to help us interpret the South African silence on climate change. The question of whether the silence results from denial, apathy or ignorance is as yet unanswered. In the context of climate change adaptation, moving forward from a place of knowledge is imperative. Research in this domain is essential; without it, mental health cannot be clearly and firmly located on the just transition road map. In the context of the marginalisation of South African communities, research methodologies need to counter the culture of extraction upon which mining and other industry have built their success. Industrial profitability has been derived largely without reciprocal care and replenishment of the environment from which materials have been extracted. A beneficial research methodology needs to model an alternate way of relating that considers the sustainability and sources of knowledge. In this vein, decolonising research methodologies are appropriate in setting community empowerment, advocacy and social change as primary objectives (Barnes 2018; Fernandes Jesus et al. 2020). Such research processes begin by assessing where communities currently are in their developmental processes and catalyse interventions for transition and adaptation. In terms of content, research on the power dynamics of resistance to climate adaptation needs is planned in partnership with the community, psychosocial psychologists and climate governors. This partnership

could develop a programme that authentically marries the needs of all parties (Fernandes Jesus et al. 2020), while remaining aware of the losses that inevitably will be part of the transition.

Community psychologists have a valuable role to play in this process as climate change activists: demystifying both psychology and climate change, communicating and translating environmental changes in relation to climate change, and serving as community process directors, researchers and mental health professionals to address the mental health challenges specific to the communities they work in.

Climate change adaptation related to both technical and mental health indicators must be taught at all educational levels to empower more South Africans with the skills to identify and intervene in mental health issues at a community level. Social support is the strongest indicator of maintaining good mental health. Community organisations must therefore play a central role in providing such support to address mental health adaptation to climate change.

An intersectoral approach to managing mental health in the context of climate adaptation, including but not exclusive to government departments, would be most effective in addressing the mental health effects of climate change adaptation.

CONCLUSION

Increased global temperatures, droughts in Africa, and wildfires in North America and Australia have started to alert the world to the severity of climate change and the human suffering it brings. In South Africa, a just mental health transition to climate change is best achieved if it is understood systemically, takes into consideration the interplay of the sociopolitical and the psychological and is mindful of the society's dynamic nature. Any adaptation measures, therefore, need to go beyond the technical, recognise the psychosocial impact and account for the psychological trauma that comes with climate change as we undertake a just transition to a low-carbon economy.





Integration of Informal Waste Pickers in the Context of a Just Transition

Moroasereme Ntsoane, Independent Researcher



GLOBAL TRANSITION

One of the dominant themes to emerge from COP26 is the plea championed by developing countries to include issues of equity, fairness and justice in the push towards climate change resilience, in what is now dubbed a *just transition*. Developing countries are concerned that the transition towards a sustainable future may, through inadvertent or wilful neglect, visit collateral economic hardship upon the most vulnerable in our deeply unequal world. At a basic level, the global dialogue must accommodate a diversity of voices, particularly from developing countries, who should be listened to and heard so that their transition-induced anxieties and aspirations find expression in climate change commitments. If we fail at this, the sustainable and future-fit world we all are striving for will remain beyond our collective grasp.

INFORMAL WASTE COLLECTORS

Nothing underscores the importance of a just transition more than the social and economic injustice meted out to informal waste reclaimers, who are now a feature of the developing world's rapidly urbanising cities. They are usually found rummaging through waste bins in search of salvageable reusables and high-value recyclables to sell for a living.

Undeniably, their waste-collection activities reveal the full depth of urban poverty. But to merely interpret their precarious reality in terms of a futile battle against urban poverty is to strip them of their real lived experiences. While their story is indeed one of deprivation of the basic essentials of life, it is also a story of inspirational collective agency, demonstrating how the vulnerable in our urban spaces can assert their right of belonging and their right to livelihood.

Far from being merely informal and survivalist, informal waste collection contributes significantly to the sustainability of urban waste streams through recycling and reuse. While most waste-reclaiming activities are animated by the instinct of survival, rather than by contemporary notions of natural resource efficiency and economic circularity, there is no denying that informal recyclers are worthy first-responders in the pursuit of a future-fit and climate-resilient world within the recycling economy. What is absent is a recognition of their valuable contribution towards sustainability, and a regularisation of their precarious and unremunerated activities.

IMPACT OF WASTE PICKERS

The itinerant and informal nature of South Africa's informal waste pickers movement makes its size hard to establish with much certainty. Estimates range between 60,000 and 90,000 kerbside and landfill waste reclaimers (Plastics SA 2019; Yu et al. 2020). Their ranks also include South Africa's homeless, as well as immigrants, mainly from neighbouring countries. Most are indigent, with little to no formal education. How-

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ever, a few have had formal education, including high school qualifications. Others have experience in skilled and semi-skilled industrial work, while others are driven by pure entrepreneurial zeal and ambition within the emerging circular economy. One thing they have in common is their victimisation by an unjust socioeconomic system that appears to be embarrassed and shamed by their existence. The same unjust system seems to believe that rendering them invisible, instead of embracing them unconditionally, is the best way to acknowledge their desperate condition and address their needs.

Waste reclaimers play an important role in municipal waste-collection systems, diverting substantial volumes of solid waste from overflowing landfill sites (Barnes et al. 2021). Following their study conducted at buy-back centres in Cape Town, Barnes et al. (2021) were able to show that waste reclaimers collect about 17,100 tonnes of recyclables per month, while saving about 41,800 cubic metres per month of landfill air space. Linda Godfrey et al. (2016) and Plastics SA (2019) have shown that informal waste pickers collect between 70 and 90 percent of post-consumer paper and packaging waste. The material thus collected is sorted and sold for pre-processing at networks of buy-back centres, waste transfer stations and recycling companies, who in turn export it or sell it to local manufacturing companies to be utilised as raw material.

THE NATURE OF THEIR WORK

Waste reclaimers' activities can entail sophisticated planning and organisation, which is often inappreciable to municipal officials and the public. In a study of informal waste pickers operating across the eight regions falling under its territory, the City of Johannesburg observed that effective waste collection entails making choices that balance competing elements of its operations (CoJ 2017). These choices include selecting and targeting areas with potentially high volumes of valuable recyclables, optimising travel routes and selecting a course that minimises uphill slopes, monitoring daily road traffic patterns for ease of passage, packing manoeuvrable loads of recyclables in bags and on trolleys, and operating near buy-back centres likely to pay more for their wares (CoJ 2017). The use of smart mobile devices for real-time exchange of price signals across buy-back centres is also well established among reclaimers.

The City of Johannesburg also showed that reclaimers prefer to form partnerships and collaborative networks across its domains. While this practice was found to be critical for sharing price and other market information, it also increased the volume of recyclables by widening the collection area (CoJ 2017). The City has sought to enhance this emerg-

ing adaptive capacity among recyclers by supporting their efforts to organise into cooperatives. Once fully functional and efficient, these cooperatives should be able to leverage their internal and external collection networks not only to assert their rights of legitimacy and recognition but also to reach economies of scale.

Informal waste collection is physically demanding drudgery, often performed under harsh weather and climate conditions, to which waste pickers have had to adapt. However, during interviews with them, it became evident that the flexible waste-collection schedules and the cash-based nature of recyclables-trading transactions are cherished features of their work. Most waste pickers prefer to start their collection activities very early in the morning, ahead of municipal waste-collection trucks, so as to have the first pick of valuable recyclables (Sikhakhane 2017).

INTEGRATION OF INFORMAL WASTE PICKERS

That recognising and integrating waste reclaimers will help create a sustainable urban environment, while also fostering social justice and inclusivity, is relatively easy to understand. What is highly contested is the approach and the form that their integration and recognition should take. Melanie Samson (2020) argues that informal waste reclaimers have already forcefully taken their place in the municipal waste management system, so we should not assume that they are waiting patiently to be integrated. Broader efforts to recognise and formalise their roles are nonetheless essential. The prevailing arrangement, with a formal municipal system of waste management operated in partnership with the private sector and a parallel, equally competent but yet informal, unremunerated and underresourced system of waste picking, is unsustainable and perpetuates inequality and injustice. The two systems should be combined into one efficient, fair and just system of waste management service provision.



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Foraging for integration experiments

The integration pathway is well travelled, as exemplified by the efforts of cities such as Belo Horizonte, Brazil (Dias 2011a, 2011b). Belo Horizonte's willingness to experiment and learn from experience offers a model of how best to formalise and recognise reclaimers. The city government started on the integration path in the early 1990s, focusing on building a grassroots movement of reclaimers, with the assistance of government and civil society (Dias 2011a, 2011b). It signed an agreement with the reclaimers association, making the association the preferred service provider for selected waste-collection activities. In a demonstration of rare political will, in 2007 the national government passed a law allowing municipalities to exclusively contract with and pay reclaimers to collect selected waste streams (Dias 2011a, 2011b). Belo Horizonte waste pickers have also won state, federal, and municipal recognition of their status in the waste sector, with laws amended to facilitate their integration.

In its pioneering integration approach, the City of Belo Horizonte recovers recyclables from the domestic solid waste stream and delivers these for processing to warehouses operated by informal waste pickers (Dias 2011a). The processed recyclables are sold to industry, with proceeds channelled back to the cooperatives for distribution among their members (Dias 2011a). By 2008, cooperatives were collecting up to 52 percent of recyclables from non-residential generators and 13 percent of all recyclables from drop-off stations across the city (Dias 2011a). Other indirect benefits for cooperatives included establishment of workshops for making and maintaining waste trolleys used

by their members, as well as establishing a value-adding pellets production company (Dias 2011a, 2011b). These two value-adding initiatives helped widen the cooperatives' revenue base and thereby enhanced sustainability.

Integration in the local municipal sphere

The City of Johannesburg has been at the forefront of integration initiatives across local government. It has also been instrumental in the establishment and continued support of the South African Waste Pickers Association, a membership-based national movement to organise and mobilise informal waste reclaimers. Various municipalities are starting to grapple with the integration conundrum, some with bold intentional statements but little action. Unfortunately, most find integration daunting because it calls for new ways of engaging and contracting with marginalised but proactive and vociferous stakeholders, something the municipalities are ill-equipped to handle.

We ought to do better

Current integration moves fail to go far enough in challenging the status quo. Authentic and sustainable integration ought to challenge existing notions of municipal waste management systems and the dominant power relations that hold current participants together. To date, no effort has proved able to reposition waste pickers within the municipal waste system's hierarchical power structure. It seems that municipal waste management systems, and indeed extended producer responsibility laws, are not ready to accommodate waste pickers (Schenck and Blaauw 2011). Current waste legislation has mapped out a role for every potential participant in the national waste management value chain, but its silence is deafening when it comes to integrating waste reclaimers. The integrated waste management plans that existing legislation requires municipalities to file do not recognise the existence of reclaimers.

Sustainable and just integration

Integration comes in different modes: the top-down variety, fully adorned with the language of empowerment; collaborations bringing together reclaimers and industry associations; public-private partnerships; freestyle and improvised integration driven by municipal initiatives; and collaborations between reclaimers and residents (Samson 2020).

At a conceptual level, the starting point for meaningful integration is the dismantling and restructuring of established practices within the procurement system for waste management, which currently benefits the private sector disproportionately, while exploiting the precarious status of informal waste pickers. All listed integration modalities should have a role to play in arriving at an integrated, efficient and fair waste management system, with equitable and just participation by municipalities, the private sector, residents, industry and waste reclaimers.

At a practical level, informal waste pickers need to be organised into formal cooperatives, small and medium enterprises and entrepreneurial entities that would be supported and remunerated fairly for the services rendered, in the same way as established private-sector entities. Although cooperatives in the recycling economy fail at an alarmingly high rate (Godfrey et al. 2016), with sufficient support, they should in time prove their worth, especially in South Africa, where levels of entrepreneurship and business literacy leave much to be desired. The City of Johannesburg led the way in this respect, not only incentivising the creation of cooperatives among waste recyclers but also offering them training in environmental laws, the circular economy, entrepreneurship, and health and safety (CoJ 2017). Samson (2020) views cooperatives as important to integration, if they receive adequate ongoing support.

The waste economy presents immense possibilities and opportunities for entrepreneurship and job creation. The introduction of extended producer responsibility is expected to help grow the sector into a sustainable contributor to the economy. Integration must therefore also approach waste recycling as an entrepreneurial endeavour with significant socioeconomic benefits for a global economy that seeks to recirculate scarce and finite natural resources. Industrial-scale waste-collection systems need to disaggregate into small collection subsystems that operate in small networked clusters even in townships, where municipal waste-collection systems have all but collapsed.

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In a country such as ours, where the rate of unemployment, especially among youth, is as high as it is unsustainable, waste collection and recycling can unlock unskilled and low-skill youth employment opportunities. For this reason, an employment-focused approach to integration within a restructured and attractive municipal waste management system should be the focus. Better collaboration across the many municipal functional domains dealing with the environment, economic development, social development and the green economy will also lead to optimal integration outcomes.

CONCLUSION

Waste pickers need formal recognition of their activities as important contributors to a climate-resilient and resource-efficient urban environment. Integration and formalisation require that they be fully and fairly remunerated for their services, while also enjoying the full and protected rights of all employees in South Africa. They must be given the opportunity to develop themselves into viable business enterprises able to grow over time. Their authentic integration transcends the latest recycling trolley designs or pin-point initiatives presented as extended public works programmes or acts of philanthropy, both of which are unsustainable. Municipalities must stop talking *about* waste pickers and instead start talking *with* them in full appreciation of their agency, and unmatched broad knowledge of the circular economy, its challenges and opportunities.

A wide-angle landscape photograph capturing a sunset scene. The sky transitions from a pale blue on the left to a bright, golden yellow on the right where the sun is setting. Below the horizon, a range of dark, silhouetted mountains stretches across the middle ground. In the foreground, a lush field of low-lying vegetation, possibly yellow wildflowers, fills the bottom half of the frame. A small, calm pond is visible in the middle ground, reflecting the warm light of the sunset. The overall atmosphere is peaceful and majestic.

OUR NATURAL RESOURCES



Adapting to Drought in South African Cities

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Cities rely on water to exist and thrive. Yet pressure on water resources is increasing due to climate variability and change, growing populations, increasing usage and pollution that is compromising water quality. Water supplies are increasingly being diversified to include 'off-grid' self-supplies alongside municipal reticulated supplies. These diversified supplies need to be managed holistically to avoid undermining each other and the wider water system. At a minimum, we need to ensure that this does not increase socioeconomic inequality and environmental unsustainability in already strained South African towns and cities. We also need to ask what it will take to transform our cities and towns into water-sensitive places where all may thrive.

As climate impacts intensify globally, cities are coming under increasing strain yet rallying to act decisively at the urban scale. Water resources and the provision of water services are particularly impacted by climate variability and change. Altered patterns of

precipitation, increasing evaporation and prolonged, inter-annual drought are growing concerns. Droughts directly impact many aspects of urban functioning, including economic productivity and jobs, health, service delivery, ecosystems and food supply. Drought negatively impacts lives in both rural and urban areas. While efforts to address drought risks traditionally focus on agricultural productivity and livelihoods, which remain critical, this essay argues for the urgency of understanding how to adapt and to reduce the impacts of drought in urban areas, at the levels of households, businesses and urban systems. Both droughts and water supply systems are regional in nature, extending well beyond a city's spatial footprint. We therefore need to understand and respond to urban drought risk from a multi-scalar systems perspective, recognising complex urban-rural inter-linkages. In the South African context, with concerns for a just transition, it is particularly important to pay attention to social and economic redress as part of adapting to drought.

THE CHALLENGES OF MEETING WATER NEEDS DURING PERIODS OF DROUGHT

As cities grow and address service delivery backlogs, more water is needed. Urban migration, internal urban growth, upward mobility and local economic growth are all fuelling increasing demand for urban water resources. Seasonal and inter-annual variation in rainfall and run-off require that water storage, treatment and distribution infrastructure ensure availability of water supplies. South Africa relies heavily on surface water supplies and inter-basin transfers that are highly susceptible to changing rainfall and evaporation patterns. As François Engelbrecht, director of the Wits University Global Change Institute, highlighted when reporting on the significance of the 2021 Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) Working Group 1 findings for South Africa, one of the major risks is more frequent and intense multiyear droughts. He even suggested that the biggest near-term climate change risk, one that could push us over a tipping point, may be a Gauteng

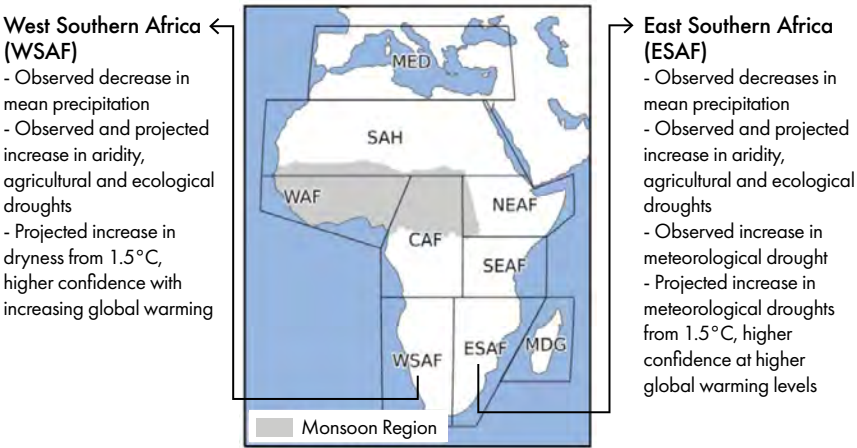


day-zero drought. IPCC AR6 shows a measured decrease in mean precipitation for the southern African region and both an observed (i.e. existing) and projected (i.e. future) increase in aridity and droughts, as summarised in Figure 1.

The different types of droughts—meteorological, agricultural and ecological—need to be managed differently. Increasing drought risk is accompanied by increased flood and fire risks, which intersect with other risks. Managing these risks is complex, with various implications for cities in terms of water and food supplies (and thereby costs and affordability), as well as biodiversity impacts.

In addition to climate variability and change, aging and deteriorating water infrastructure strains water supply and distribution systems, with a lot of water lost to leaks and considerable supply interruptions due to burst pipes and malfunctioning pump stations.

Figure 1 • Observed and Projected (Mid-21st Century under 2°C Global Warming) Regional Changes for Southern Africa (Eastern and Western Subregions) Presented in IPCC Sixth Assessment Report



Notes: CAF = Central Africa; MDG = Madagascar; MED = Mediterranean; NEAF = Northeastern Africa; SAH = Sahara; SEAF = Southeastern Africa; WAF = West Africa.

Source: IPCC (2021b).

For example, in Nelson Mandela Bay around 35 percent of potable water supply is lost to leaks. Across South Africa, growing numbers of cities and settlements are running very low on water. Innovations are increasing in response to this. For example, in Sol Plaatje Local Municipality in the Northern Cape, dry sanitation systems have been piloted as an alternative to waterborne sewage systems (Rabe et al. 2012). In 2011, during an extreme drought, Beaufort West Local Municipality in the central Karoo built South Africa’s first direct potable reuse plant that reclaims and reuses wastewater (Rabe et al. 2012). These examples represent innovative ways of dealing with water scarcity, but they remain all too rare. The challenge is to speed up the replication and scaling out of such innovations to many more urban settlements.

In the face of increasing scarcity, municipalities are employing various strategies to severely limit water use. These strategies include usage restrictions, increasing tariffs, pressure reduction, installing devices that monitor and cut off supply, and intermittent water outages. In extreme cases municipalities or private non-governmental organisations resort to driving in water tankers, often resulting in people queuing with buckets for hours to collect water from trucks, leading to tensions and sometimes social unrest. New strategies are needed to adapt before such moments of crisis and unrest occur.

COLLECTIVE CAPACITY NEEDED TO MANAGE DROUGHT RISKS

To ensure that water can be piped into urban areas, significant capacity and coordination is needed across municipal, provincial and national government actors. In South Africa, the national Department of Water and Sanitation is responsible for ensuring that the country’s water resources are protected, managed, used, developed, conserved and controlled in ways that enable the effective and equitable delivery of water supply and sanitation services. To do so they work with provinces and local governments, including metropolitan municipalities (or ‘metros’), which are responsible for delivering water services through the distribution of water to industrial, commercial and domestic users. A challenge emerges during droughts, when government water services departments need to reduce water use to stretch out the resource, which reduces their revenue. Efficiency and reduced use are needed to adapt to drought. Yet increased finance is needed to invest in new and diversified water supplies, including bulk groundwater abstraction (in some places linked with managed aquifer recharge), water reuse, upgrading distribu-



tion infrastructure, inter-basin transfer schemes and in some cases desalination plants. Declining water quality in many cities creates additional water treatment costs, as well as health risks for people and ecosystems.

The growing focus on the importance of ecological infrastructure for managing water stress requires that we better understand catchments and aquifer recharge zones as integrated systems. The work involved in rehabilitating, managing and maintaining ecological infrastructure, such as invasive species removal in upper catchments and wetlands, could increase jobs in the water sector. Growing attention to sustainable urban drainage in cities is helping water to infiltrate and add to local groundwater

sources rather than flow out to sea or surrounding rural areas.

The Greater Cape Town Water Fund is an example of a public-private partnership and evidence-based business case that shows the value of strategic ecological restoration efforts (TNC 2022). As part of the project, invasive alien plants are removed to maintain restored native vegetation in priority sub-catchments. Using less water for alien plants means increases the yield of the Western Cape Water Supply System, while also supporting job creation for those doing the clearing.

Water in cities depends on how water in the surrounding areas is managed and used, including agricultural and industrial water uses in the wider city region. While government is central to managing water resources and drought, it cannot do this alone. One of the most important ways to reduce water stress is to reduce water use and increase efficiency. This requires collaboration with the private sector and with citizens. In a country mired in mistrust of government, this is difficult to achieve, especially during times of water crisis, when tensions are high.

A JUSTICE LENS ON URBAN DROUGHT RISK IN SOUTH AFRICA

Although drought can have a significant impact on the livelihoods of poorer households, for many the daily need to secure water and sanitation in addition to income is more challenging. The challenge includes important gender and age dimensions, as the burden of securing household water often falls disproportionately on women. The impacts of poor health from a lack of clean water for washing, cooking and cleaning often affect children and the elderly more severely. For local governments, drought can prompt a focus on water infrastructure and increasing efficiency, making it easy to lose sight of justice issues around expanding water access and improving levels of service delivery to low-income communities and informal settlements. We therefore argue that although drought risks are a concern for social justice, improving access to water services and sanitation is most important for addressing the root causes of vulnerability to drought risk for the urban poor.

One area that needs attention is water pricing. Drought places a strain on urban water finance as less water is used when restrictions are in place, resulting in less revenue. In response, municipalities often increase water prices, but rising tariffs can severely impact poor households (Dikgang et al. 2019). Municipalities still have to cover the high fixed costs during droughts, such as infrastructure and treatment, even if less water is available and used. Some municipalities have responded by trying to introduce a fixed charge but have met resistance as that again creates an affordability problem and hits the poor the hardest. In other instances, there are large and “strategic” water users whose water is subsidised or who pay low prices that were set in advance. This also strains finances. Municipalities therefore face trade-offs between revenue stability and covering costs.

For local governments, drought can prompt a focus on water infrastructure and increasing efficiency, making it easy to lose sight of justice issues around expanding water access and improving levels of service delivery to low-income communities and informal settlements.

Metros tend to bill for water regardless of how many people are in the household. When there are restrictions, households with high numbers of dwellers get hit hardest, particularly if there are backyard dwellers. The high water bills can financially cripple households, often leading to payment arrears and the suspension of water provision. In other cases, it is wealthy households that are using large volumes of water, which they feel they can afford. Targeting these wealthy households to reduce water consumption is important in ensuring water for all, but this has a direct impact on revenue and cross-subsidisation. Meeting demand management incentives, ensuring affordability for the poor and achieving revenue stability are difficult to balance. This also needs to be considered in the broader sustainability context, recognising that in some years rainfall will be above normal.

During drought, diversifying supply often becomes a priority for the government, which adds to the cost of water. This requires attention to who bears that cost. Some businesses might be willing to pay in order to increase security of supply, while households may not be willing or able to pay. Lack of secure supply and increasing costs drive some water users, who can afford it, to invest in alternative self-supply options, like rainwater collection and storage, wellpoints or boreholes, greywater recycling systems, and in some cases even private desalination facilities.

Decentralising water supply is one way to adapt to low levels of bulk water supply. Although not always preferred by local governments, in part because of challenges in managing water quality, households and businesses often try to manage droughts by supplying themselves. Sinking boreholes or well-points, installing rainwater tanks and greywater systems all require significant investment, making this hard for the urban poor. Rebates for rainwater tanks might help poorer households access their own water supplies. It is important to understand the real risk of exacerbating inequalities during a drought, as those with the resources to do so install off-grid water solutions and backup systems, while those who cannot afford it suffer from reduced and intermittent supply and high tariffs.

The other justice angle to consider is that of employment. When businesses (like hotels) and industry (like beverage manufacturing companies) are hit with water shortages and/or the costs associated with installing alternative supplies, what does this do to the job market? Does it result in the permanent or temporary layoff of employees, and does this disproportionately affect low-skilled jobs and thereby poorer households? What does it require both to protect existing jobs in times of water scarcity and to create new work

opportunities in the kinds of work required to enhance drought resilience (like maintaining waterways and widespread manual monitoring of water levels, flow rates and water quality)?

OPPORTUNITIES FOR BUILDING URBAN DROUGHT RESILIENCE AND WATER JUSTICE

Recognising the interconnections between ecological and engineered aspects of the water system, between rural and urban sources and uses of water, and between the water quantity and quality implications of land uses creates a broad set of opportunities for increasing drought resilience. A holistic approach enables localised, low-tech, community-based interventions. This includes re-establishing and encouraging the use and preservation of local springs, reconfiguring local stormwater detention ponds to increase infiltration and groundwater recharge while also providing local green spaces and recreational facilities. Local interest or neighbourhood groups (whether constituted as cooperatives or 'Friends of' civic organisations) can also be mobilised to rehabilitate and maintain local stretches of river and wetlands.

When aiming to strengthen urban drought resilience, it is important to consider the capacities that will be needed to adapt. Drawing on international work in this field, we offer nine dimensions of adaptive capacity that we think are useful for strengthening cities' ability to deal with recurrent droughts.²

1. *Awareness*: The grasp that various actors have of what drought means for the resilience and sustainable development of cities, for the mission of their organisation/department and for particular areas of responsibility, now and into the future.
2. *Agency*: The capacity to spot, prioritise and develop opportunities for meaningful and timely action in response to information about droughts.
3. *Leadership*: The extent to which a formal leadership team has developed a strategic vision in relation to managing the water and drought aspects of climate change and engages with, supports and legitimises its implementation.
4. *Champions*: The capacity to identify, develop, empower and support a group or 'ecosystem' of champions at different levels so that they can be effective agents of change.
5. *Working together*: The capacity to participate in, learn from and act in collaborative partnerships with internal and external groups.

6. *Learning*: The extent to which organisations generate and respond to feedback from innovation, even on a small scale, and make sense of and communicate new information to improve procedures, strategies and mission.
7. *Programme scope and coherence*: The extent to which projects sit within an overall strategic programme of action, suited to the scope of what the organisation is trying to achieve and updated in the light of what is learned.
8. *Managing operations*: The embedding of procedures to come to grips with drought risk in a systematic way to ensure that intentions and policies turn into action.
9. *Expertise and evidence*: The capacity to recognise, access and deploy the necessary technical and change ‘know-how’ and information to make the biggest difference.

For each of these capacities, South African cities offer examples which can be learnt from, adapted, transferred, replicated and scaled out in order to strengthen urban drought resilience. Often building urban resilience requires working beyond the city scale at the catchment and basin scales. For example, the uMngeni Ecological Infrastructure Partnership (UEIP) focuses on managing investments and implementing projects to improve water security, reduce flooding and support economic growth in KwaZulu-Natal (SANBI 2022). This includes the city of Durban, where the Palmiet River Rehabilitation Project (PRRP) is a demonstration project within the UEIP (SANBI n.d.). The PRRP has involved building a diverse and multi-sectoral community of innovation that brings community members (including leaders from the Quarry Road West Informal Settlement), the municipality and academics into decision-making processes to collate existing data, prioritise actions, bridge communication gaps and avoid duplication of efforts. One innovation has been the training and employment of local ‘enviro champs’ in informal settlements to drive education awareness campaigns around water and river rehabilitation, especially in local schools.

As much as building drought resilience and water equity requires catchment- and basin-scale interventions, it also takes small-scale initiatives, experimenting with what works in local contexts to bring people’s lives and livelihoods into closer connection with water sustainability. An example of such initiatives might entail training community members in the plumbing skills needed to detect and fix leaks. The Nelson Mandela Bay Business Chamber coordinates an Adopt-a-School initiative (NMBBC 2021). Local businesses in the metro have adopted schools identified as high water consumers due to faulty or damaged plumbing. The businesses support the schools to fix and replace faulty

infrastructure, install new meters to monitor usage and install rainwater tanks and/or boreholes to supplement their supply. Sustaining and scaling out these sorts of partnership-based community initiatives, especially those that connect high- and low-income communities, will be critical to building drought resilience across South Africa’s cities. Identifying the most important capacities for adapting to urban drought in different contexts and depending on resources is challenging but important.

MOVING FORWARD

The risk of drought to cities and growing towns across South Africa is already apparent and set to intensify unless significant change is enacted. Wasteful water use and losses out of the water system need to be heavily curtailed; the recycling and reuse of water needs to be significantly increased; runoff, stream flows and groundwater infiltration need to be enhanced; water pollution needs to be avoided at source; and water supplies need to be diversified. All of this needs to be done in an inclusive and engaging way, so that people across the board understand and are integral parts of solutions. It requires a whole-of-society approach, investing in the work of skilled intermediaries to strengthen and sustain engagement and collaboration between public, private and civil society actors in the science, policy and practice domains within cities, as well as between cities. Including vulnerable communities that are hard hit by water shortages and water restrictions but historically have not had a voice in water-planning processes has to be prioritised. This includes explicitly considering gender-related aspects when enhancing adaptive capacity. The burden of drought and water shortages often falls disproportionately on women, who tend to take on the demanding and time-intensive task of sourcing water and suffer health impacts due to a lack of water for hygiene. Children also often suffer the health impacts of using or playing in contaminated water. As much as possible, initiatives to strengthen urban drought resilience need to create new jobs and livelihood opportunities involved in maintaining rivers, streams, wetlands and infiltration ponds; installing greywater systems and rainwater harvesting systems; and community-based monitoring of water quality and groundwater levels. Support and new financing models will be needed to ensure that these materialise and can be sustained.



Rethinking Markets for Food Systems Transformation in Southern Africa: A Just Transition

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A JUST TRANSITION IN FOOD AND AGRICULTURE?

Climate change requires rapid, major and systemic economic changes at the local, national and global levels. Food supply is estimated to account for around a third of greenhouse gas emissions (Crippa et al. 2021). African countries, however, are responsible for negligible emissions and yet face urgent challenges of adaptation to global warming and extreme weather events which threaten production.

A just transition must address the adaptation challenges of African countries while also moving food systems to a sustainable footing with lower emissions. These changes all work through market mechanisms.

Emissions in food are mainly associated with meat and dairy production and the associated animal feed and land use changes (Poore and Nemecek 2018; Crippa et al. 2021; see also OECD n.d.). Production and trading of meat and the main animal feed constituents such as soybeans and maize are concentrated, within and across countries (Swinnen 2020; Blas and Farchy 2021; Clapp 2021). The changes required in the food systems transformation are thus about the decisions of a relatively small number of lead firms and the markets in which they operate.

Large incumbent firms have typically invested and innovated to build up their market positions. At the same time, to borrow Warren Buffett's metaphor, they build moats around their positions to protect themselves and their profits from rivals (see Eeckhout 2021). What has this to do with climate change? First, the rapid change in food systems means business models have to change and this may well be led by disruptors, as we have seen in other sectors such as motor vehicles. Incumbents are naturally invested in current production systems, have the most to lose from systems changes and are likely to delay and try to control the process of change. Conversely, dynamic competition which opens markets up to disruptors can be a powerful positive impetus for change, including by incumbents if and where they can pivot.

Second, to win broad-based support, climate change measures need to be fair. This means that we must tackle inclusion along with the transformation in production systems. Competition law and policy is an important tool to work for inclusion. It can tackle the market power and anti-competitive practices that mean smaller market participants, including farmers, are undermined and have their returns squeezed by powerful suppliers and buyers.

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VULNERABILITY TO AGRICULTURE AND FOOD SYSTEMS IMPACTS

African farmers are among the most vulnerable to extreme weather. Southern Africa, in particular, is a climate ‘hotspot’ where temperatures are increasing above the global average and rainfall is projected to decline further (IPCC 2021c; Engelbrecht and Monteiro 2021). This is notwithstanding good rains in South Africa in 2021 which risk lulling us into complacency. Meanwhile, Kenya is experiencing drought and high food prices and Brazil faced the worst drought in close to a century in 2021 under the La Niña weather cycle. The La Niña cycle is continuing in 2022, bringing substantially higher food prices around the world.

South Africa urgently needs to face up to the challenges and provide leadership on the continent to tackle the risks. The country will be hit by another El Niño cycle in coming years like that which brought the drought of 2015–16, but likely much worse. Meanwhile the overall warming continues.

The good news is that the wider southern Africa region is blessed with enormous potential for agriculture, including water and land in countries such as Zambia and Tanzania. With cooperation, investment and appropriate policies this potential can be realised in resilient regional value chains, creating jobs and growing economies across the region.

At the same time, the food produced needs to be healthy, nutritious and affordable. However, South Africa and other African countries face a massive and growing ‘double-burden of malnutrition’, with high levels of obesity alongside stunting and wasting (Reardon et al. 2021). Substantial proportions of the population cannot afford enough calories, while many others are buying excess calories in the form of ultra-processed

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food which is high in sugar and fat but not nutritious. Markets which deliver cheap and convenient food but with low nutritional value are fundamentally failing and impose huge health costs.

For the required food transition to be just, we therefore need to address the interconnected and concentrated nature of the global food system to empower groups with limited resources through inclusive and fair processes to ensure healthy markets.

ENGAGING WITH ECONOMIC POWER IN FOOD VALUE CHAINS

Food systems are highly governed—privately and publicly. Food is produced and marketed through hyper-globalised and highly concentrated international food value chains running from agricultural inputs right through to the advertising campaigns and retailers which shape our consumption choices. This matters because for measures to be effective in achieving the food systems transformation the rules must reshape markets to incentivise changes by the large corporations as well as the challenger firms. The extensive food standards and regulations need to be fit for purpose to ensure healthy market outcomes and investments in the transformations needed.

In South Africa, as globally, key markets are dominated by a relatively few companies—and the just food transition needs to engage with them. From seeds and other farming inputs through to processing and retail, there have been very substantial increases in

concentration globally, including through hundreds of mergers (Howard and Hendrickson 2020; Clapp 2017, 2021; Swinnen 2020; Torshizi and Clapp 2021). In the supply of grain seed in South Africa, concentration is among the highest in the world, as four or fewer companies account for almost all sales of maize, soybean and sunflower seed (OECD 2018; CCSA 2021). The picture is similar for agrochemicals, globally and in South Africa. In agro-commodity trading, the major companies are integrated upstream and downstream, such as into feed and meat production (Blas and Farchy 2021).

Supermarkets and major food processing companies shape consumer choices. These companies need to be part of the solution. In South Africa and the southern Africa region, a handful of large supermarket chains are important gatekeepers for food processors to access end consumers. With growing store networks extending beyond urban areas, and increasingly into peri-urban and rural areas, these supermarket chains enforce both mandatory and private standards which influence the availability, safety and quality of food on shelves. They also influence other attributes that affect consumer purchasing decisions, such as packaging, promotions, advertising and positioning on shelves.

In South Africa, five national supermarket chains control 64 percent of the grocery retail market (CCSA 2019). These chains have significant buying power, particularly in their relationships with small and medium enterprise (SME) food producers, and are able to dictate terms and conditions of sale. SME food processors are often pushed to sell through alternative routes to market given the high costs and risks they face in supplying the main supermarket chains (das Nair 2020). Often only a few large, multinational and diversified food processing companies are able to meet the requirements of supermarket chains. Food processing experiences similarly high levels of concentration in many products in South Africa (CCSA 2021), and these players are also able to shape what is demanded by consumers. Concentrated food processing and retail markets limit the benefits that greater competition and diversity brings in terms of availability, cost, quality and choice.

Food systems transformation therefore needs to engage with concentration and integration if it is to address sustainability and inclusion together, through deliberately reshaping value chains for food security, resilience and health. This requires adding *agency* and *sustainability* to the four key food security pillars of *availability*, *access*, *utilisation* and *stability* (Clapp et al. 2022). The transformation is not anti-business—it is essential for the future of businesses and markets.

Engaging with firms means recognising the multiple dimensions of their influence and how rules can work most effectively to channel incentives towards the transformations required. One aspect of economic power is market power—where firms can charge high prices that exploit consumers. Powerful firms can also exclude rivals by, for example, controlling access to key inputs or marketing channels as highlighted above.

The market power of large firms is tempered by competition and generally requires effective competition enforcement to ensure that markets are open and fair. Competition means farmers have options to sell their produce and in sourcing inputs. Smaller agro-processors have alternative routes to market for their products and are not reliant on a very few large retail chains.

Economically powerful firms further use their influence to lobby and to govern value chains such as by setting standards, shaping regulations and acting as gatekeepers (Dallas et al. 2019; Mondliwa et al. 2021b; Roberts 2020). Competition means that this power is diluted and governments are less susceptible to capture by concentrated business interests.

South African competition cases have shed light on the ways positions of market and economic power can be protected and extended. Control at one level of the value-chain can be exerted to undermine rivals, such as through positions of substantial market power in grain storage (the Senwes case), poultry breeding stock (the Astral-Elite case) and in supermarkets' use of exclusivity in leases in shopping malls (Roberts 2020; Bonakele et al. 2022). These cases have been tackled by the competition authorities to address discrete anti-competitive practices. However, while proscribing such conduct removes a barrier to competition, it is just one step and does not in itself create healthier competitive markets.

We need to recognise that vertical and horizontal integration in food production enables synergies to be realised, such as in providing farmers with a bundle of goods and services. It also means large firms can control who gets to participate along the different levels of production and processing that they coordinate. We need to rethink competition as part of sector policies to reshape markets for investment, growth and healthier outcomes, taking into account digitalisation and climate change.

The rethink of competition policy involves analysis of markets beyond the piecemeal investigation of discrete alleged contraventions. This can be done through market inquiries which have the power to assess the combination of factors that lead to poor market

outcomes and which take steps to remedy them. The Competition Commission South Africa is an international leader in using inquiries. Inquiries need to have the resources for authoritative, rigorous assessment and the ability to ensure that remedies are implemented. In strategic areas, inquiries can lead to enforceable codes of conduct, which are effectively tailored rules and a referee to ensure better market outcomes. Codes of conduct have been adopted in a number of countries, such as the United Kingdom and Namibia, for supermarkets in recognition of the central role large supermarket groups play as gatekeepers of supply chains and shapers of consumer choices.

Competition policies are complements to appropriate sector strategies. Government-sector strategies can work with industry bodies to transform industries for the collective benefit—building inclusion and sustainable value creation—as is exemplified by the citrus industry in South Africa (see Box 1).

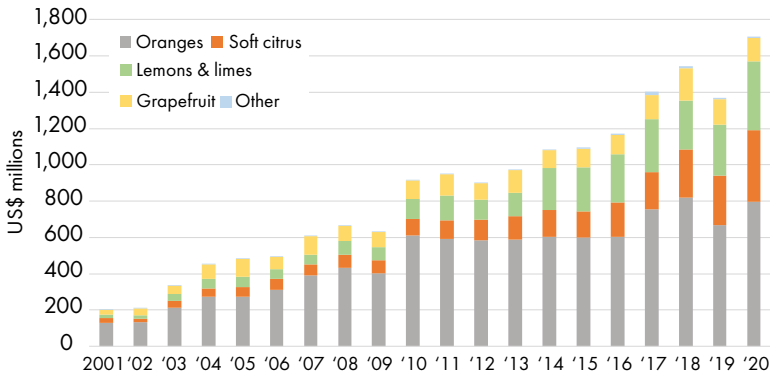
Box 1 • The Leading Example of South African Citrus

The South African citrus industry represents the huge potential gains from collective action working with government for value-chain upgrading. South Africa has grown to be the second-largest citrus exporter in the world. The success has been driven by higher-value ‘soft citrus’ varieties along with lemons and limes, which nearly quadrupled exports from US\$202 million in 2010 to \$730 million in 2020 (Figure 1.1). This reflects two critical points: first, the planting of trees to respond to changing global demand patterns; and second, the growing sophistication in a range of capabilities, including the cultivars being planted, compliance with phytosanitary standards, infrastructure in cold chain and logistics, and marketing.

Frequent drought conditions and the higher prevalence of pests and diseases are leading farmers to invest in cultivars that are adaptable to local conditions, coupled with new technologies in irrigation, pest control and precision farming, to maintain and improve production. Farmers have been adopting low-flow micro- and drip-irrigation technologies, including fertigation systems to fertilise and irrigate crops at the same time. Precision agriculture methods use water more efficiently and improve monitoring of trees’ nutritional needs. They also include smart spraying systems to limit the quantities of chemicals sprayed to control diseases and pests.

Box 1 • The Leading Example of South African Citrus (Cont.)

Figure 1.1 • South Africa’s Citrus Exports



Source: TradeMap, as in Chisoro-Dube and Roberts (2021).

The role of the Citrus Growers Association (CGA) has been central in investments and coordination to support shared capabilities and upgrading over time. This includes working with government to secure market access, conduct research, provide technical support and logistics, and facilitate transformation in the industry. Closely related is the CGA’s work on digital systems to improve compliance by producers in the value chain through the development of an electronic data-sharing platform, Phytclean, for issuing export phytosanitary certification. This practice has been expanded to other fruits.

The CGA has also been entrepreneurial in establishing businesses to compete with large incumbents who otherwise would have market power over farmers. This includes the CGA Cultivar Company to develop and source new cultivars, both locally and internationally. CGA also established River BioScience, which supplies crop-protection products and services in competition with multinationals such as Monsanto.

The citrus industry has combined upgrading with inclusion as the Citrus Growers Development Company works with Black farmers to enter and grow in high-value export markets to ensure ‘land reform for wealth creation’. It demonstrates how opportunities can be realised while addressing climate change through investment and technologies coupled with market access to meet increased global demand from health-conscious consumers.

Source: Chisoro-Dube and Roberts (2021).



DIGITALISATION, AGRICULTURE 4.0 AND EFFECTIVE COLLECTIVE ACTION FOR TRANSFORMATION?

The digitalisation of production, marketing and delivery in agriculture and food markets increases the efficiencies which can be realised by integrated companies (das Nair and Landani 2020, 2021). It also reinforces concentration and means that market power spreads across markets (Eeckhout 2021).

In contrast, what has been termed Agriculture 4.0 covers advances such as vertical farming, circular agriculture and aquaponics, along with the digitalisation of food production systems (Klerkx and Rose 2020). Digitalisation is enabling smart and precision agriculture solutions so that the farmer can anticipate and respond to climate-related weather changes, including through more effective water management and reduced chemical usage. Farmers can meet traceability and certification requirements at lower costs, as with the Phytclean platform developed by the fruit industry in South Africa (see Box 1). Digital tools are also improving logistics, packing and marketing functions through the value chains, lowering the costs to access markets.

The integration of the major companies, combined with the digitalisation of economic activity, makes these businesses effectively building platforms, with rich datasets coupled with logistics and agronomic and advisory capacities. This may require reconsideration of what rules and policies businesses should follow to ensure that markets are healthy and open to wider participation and that power is not exploited.

Understanding what the major firms are doing is critical. However, the increased market data being collated are mainly in private hands, tipping the balance against governments and in favour of the large corporations aggregating and analysing the data.

AN AGENDA

The agenda is necessarily ambitious as time is rapidly running out. The creative and disruptive impetus of market participants needs to be unleashed to bring solutions that reshape value chains. We propose a four-pronged package.

First, the state needs to be an *effective gardener* (Wu 2018)—cultivating the soil for a *diversity of firms to flourish*. This involves proactively taking down the barriers (Vilakazi et al. 2020) that prevent small firms from flourishing. A package of measures should include access to routes to market for these businesses, providing development finance and effective support for skills and technology adoption. These are part of green and inclusive industrial policies tailored to sectors and value chains, measures that invest in shared infrastructure, advisory services and finance as part of a green industrial policy for food (Andreoni et al. 2021). Real economic transformation requires sustained support for the capabilities of Black entrepreneurs and farmers.

Second, we need to elevate *vigorous competition and inclusion* by opening up markets. This means placing the onus on dominant firms to justify why competition will not be undermined when they make acquisitions or enforce exclusionary agreements on smaller participants. Competition authorities must be active referees updating the rules for changes in technologies and practices, and ensuring that we consider the effects of firms' conduct across the economy. The agenda being advanced with regard to digital platforms shows the way, with changes to *place the onus on gatekeeper firms* not to distort competition in mergers or to abuse their market dominance.

The *amendments* to the South African Competition Act are important for taking into account wider participation by SMEs and businesses owned or controlled by historically disadvantaged people, and for including provisions related to buyer power. We need to go further if we are to square up to the reality of the past three decades and the enormity of the transformation challenge posed by climate change on top of the entrenched levels of inequality. We need to incentivise investment in new productive capabilities in sustainable food supply, with a diversity of approaches and business models (Andreoni et al. 2021; Mondliwa et al. 2021a).

The *merging of competition and consumer-protection regimes* should bring the authorities together under one institution. Both involve collecting information on markets, consumer decisions and firm conduct. Both bring synergies in analysis and enforcement.

Market inquiries are a powerful tool available to the Competition Commission to better understand features of markets that prevent, distort or restrict competition (Bonakele et al. 2022). Inquiries in food markets should investigate the impact of concentration on sustainable food production and distribution, as well as on access to affordable and healthy food. Efforts are underway as part of the Agriculture and Agroprocessing Master Plan to secure voluntary commitments from large supermarket chains and agro-processors to diversify their supplier bases and invest in building capabilities of SME suppliers through supplier-development programmes. However, the key role of supermarkets in organising value chains and shaping consumption may mean that a *code of conduct for supermarkets and groceries* also needs to be adopted as soon as possible. Ideally this should be consistent across countries in the region, learning from the experiences of those already in place such as in Namibia, Kenya and the United Kingdom.

Third, *monitoring and tracking markets* is essential as climate change leads to more frequent and deeper shocks. Building the package of measures to change direction will also be a process of trial and error. Both monitoring and tracking need ongoing information gathering and analysis by public bodies in order to advise government (Fanzo et al. 2021). The monitoring needs to be of production, prices and patterns of consumption to ensure early warning of the impacts of shocks, while the tracking follows the effects of interventions. Huge amounts of these data are being collated by private market participants. The data should be accessible in the public interest (as is the case in observatories such as that of the European Union). Instead, the concentration of data in the

hands of the large integrated firms has increased their lobbying power and enabled them to make large arbitrage margins and speculate in response to climate shocks (Nsomba et al. 2021).

Fourth, the food systems transformation must be a *regional plan* to reshape healthy value chains through a balance of cooperation and competition. The lead firms operate regionally (and globally) and the climate change impacts can be mapped across the region. Moreover, the opportunity to adapt and grow must take advantage of the abundant water resources in the region and the fact that when extreme weather events occur in some parts of the region conditions remain good in others. The reality, unfortunately, is fragmentation of national agendas and beggar-thy-neighbour policies. South African leadership is urgently required and is in the country's self-interest given both its vulnerability and the financial resources which can be mobilised for investment.

Future food security depends on sustainably unleashing this potential through effective *regional food industrial policies*. And growing economies across the region will lift South Africa. We are already behind the curve given the climate projections and urgently need to make investments across the region in water management, research and infrastructure to support sustainable and resilient food production (Nsomba et al. 2021). Adaptation requires diversifying crops and the seeds suited to conditions. A 'farm to fork' strategy for southern Africa requires concrete actions in key value chains starting with poultry to animal feed and fruits and vegetables (Kaziboni and Roberts 2022). Such a strategy can be informed by successes, notably in citrus, where there has been value creation, job creation and land reform for wealth creation.

Credible and robust engagement requires the evidence base, the mobilisation of coalitions for collective action (as in the citrus industry) and the employment of clear policy levers, both carrots and sticks, to bring the needed change in direction.



Unequal Water Access in Cape Town and the Just Transition

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This essay considers urban adaptation and water governance in the light of lessons learned from work undertaken by the Environmental Monitoring Group (EMG) with communities in Cape Town. As highlighted by the Presidential Commission Synthesis report, water is a critical and scarce resource that will be increasingly threatened by climate change, and equitable allocation of this resource will need to be ensured through a just transition (Climate Commission 2021a). Any transition would be demonstrably unjust if the poorest sections of the population were left without equitable access to water. This is equally true of other essential needs, such as housing, waste management and employment. Achieving zero carbon emissions is by itself of little value to citizens if they lack a secure water supply, decent shelter, a clean and safe environment or a livelihood.

THE JUST TRANSITION

The concept of the just transition emerged in the 1970s to address the impact of environmental legislation on energy-sector jobs (Overy and Halsey 2021). Practical examples of the just transition still tend to focus on this aspect of the just transition. The Just Transition Center highlights Spain as an example where coal-sector workers who have lost jobs as the country transitions to renewables receive training and/or compensation (Smith 2017). More recently, reporting by the UN Framework Convention on Climate Change (UNFCCC) and South Africa's Presidential Commission on Climate Change have recognised the broader meaning of the just transition. But, as Neil Overy and Richard Halsey (2021) argue, South Africa remains at the preparatory stage of the just transition, and 'little has yet translated to tangible action on the ground'.

The global North may be in a position to adapt to climate change with fewer major social or ecological breakdowns, whereas in the South the same impacts are far more likely to be catastrophic given the levels of poverty, unemployment and inequality and the ways inequity restricts our ability to adapt to climate change. This point is clearly illustrated by the Intergovernmental Panel on Climate Change (IPCC) in its recent *Sixth Assessment Report*. Part 2 of the report, 'Climate Change 2022: Impacts, Adaptation and Vulnerability', notes that the 'vulnerability of ecosystems and people to climate change differs substantially among and within regions, driven by patterns of intersecting socio-economic development, unsustainable ocean and land use, inequity, marginalization, historical and ongoing patterns of inequity such as colonialism, and governance. Approximately 3.3 to 3.6 billion people live in contexts that are highly vulnerable to climate change' (IPCC 2022a).

In wealthy countries where access to welfare, housing, water and sanitation, health care and the like are nearly universal, the ability to shield citizens from climate disasters and respond effectively to disasters is high. Nations in the global South are already experiencing worse climate impacts than the North, and this trend will increase with rising temperatures and more extreme weather events. For example, Madagascar's environment minister pleaded for 'climate solidarity' at the 2021 UNFCCC Conference of the Parties (COP), as the country faced what was termed the world's first climate change-driven famine (Crawford 2021). At an international level, the tendency to focus narrowly on the energy transition reinforces climate injustice, with the implicit neocolonial understanding that developed countries can continue to benefit from their historical



and current high use of fossil fuels, while developing countries are blocked from exploiting new fossil fuel resources (Harvey and Greenfield 2021).

It is imperative that a just transition rapidly build a society better able to adapt and respond to the increasing impacts of climate change. In South Africa, even without climate change, the burdens and pressures on society are overwhelming. Climate change adds additional pressures. A just transition has to encompass building a far more equitable future as

a fundamental part of ensuring South Africa's adaptation to climate change. High levels of unemployment, poverty, food and housing insecurity will ensure that those living on the margins are further marginalised and bear the brunt of climate change. These stresses have already begun to highlight fault lines in the fabric of South African society in the form of persistent service-delivery protests and the civil unrest and rioting that took place in South Africa in July 2021 (Sinha and Naidoo 2021). Although the unrest was primarily in KwaZulu-Natal and parts of Gauteng, the rest of the country was on a heightened level of alert, as the riots resulted in an estimated R50 billions of damage and 354 deaths between 8 and 17 July (Africa et al. 2021).

There is understandable concern that continued civil unrest will undermine South Africa's development and lead to its being regarded as a failed state (Neethling 2021). A failing state would struggle to access international climate finance and be unable to implement the wide array of policies and development interventions needed to adapt to climate change. Adapting to climate change is not a luxury for the country, nor is it only relevant for wealthier citizens; it is fundamental for the survival of the just, sustainable and democratic state envisaged following apartheid.

WATER ACCESS AND GOVERNANCE CONTEXT

Water security issues and unequal access to water highlight the need for transformative adaptation. Adaptation is not about tweaking the system; it requires fundamental change. Existing problems show that governance systems are ill prepared for the

adaptation challenges we face. Water is a critical and scarce resource that will be increasingly threatened by climate change, hence the need for a just transition that ensures an equitable allocation of this resource (Climate Commission 2022b). In the Western Cape, water availability is predicted to decline as climate change takes hold. EMG's work on the 2009–10 drought along the Garden Route and on the 2015–18 drought in Cape Town highlight important lessons (EMG 2021):

- In both cases there was a lack of political will to invest in water infrastructure prior to the drought. The emergency plans to add water supply on short notice, such as through desalination, were costly and proved to be a poor use of resources, further highlighting the need for proactive investment in water infrastructure.
- Government was slow to respond to the severity of the droughts and only imposed severe water restrictions when supply levels were critical. A more long-term approach would help avoid the need for severe restrictions when drought occurs.
- Government did ultimately impose severe restrictions, increased tariffs and initiated consumer education campaigns that succeeded in drastically reducing water use by households. In Cape Town, both rich and poorer households were using 200 litres of water a day towards the end of the drought, highlighting that water inequality is not inevitable.

The South African Water Caucus (SAWC) is a network of water activists and non-governmental organisations (NGOs) that for two decades have been fighting for water justice and a government more responsive to the needs of the poorest people. SAWC has engaged with national policy processes and issues such as water quality, drought response and water pricing and tariffs. It is comprised of provincial groups that respond to issues of particular concern at a local level. Western Cape Water Caucus (WCWC) activists have long been struggling to ensure that households have dignified access to basic water and sanitation. Since 2008 a key focus has been resisting the rollout of water management devices (WMDs).

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The current water governance approach in South Africa assumes that it is reasonable to restrict access to water if bills are not paid or if indigent households use more than their allocated amount. The legality of restriction by prepaid water meters was clarified in the Constitutional Court's *Phiri* decision (Constitutional Court 2009). This ruling has enabled municipalities to implement the use of WMDs rather than focus on addressing the underlying systemic and socioeconomic conditions preventing payment. WMDs in Cape Town are set to cut off water after users consume the daily limit of 350 litres. WCWC activists have fought against the use of WMDs for over 10 years. Ongoing problems relating to these devices have included the following:

- Lack of consultation around their installation
- Undetected leaks that lead to daily water cut-offs
- Technical failures of WMDs that lead to cut-offs
- Disagreement about the number of people in a household, especially when it includes backyard dwellings
- People still getting bills after being told that the WMD would mean no more bills
- Lack of technical assistance when problems are experienced with WMDs (Pereira 2009; EMG 2016)

These issues have persisted, despite the WCWC's efforts to engage authorities to find resolutions. In a tacit understanding that WMDs were problematic, the City of Cape Town (CoCT) agreed to decommission their use from July 2021 (CoCT 2021c). The new 'free-flow' metered system introduced late in 2021 means that indigent households will now have flow restrictors put in place if they use more than 15,000 litres per month over a two-month period. The City affirms that indigent households 'will be responsible for ensuring [that their] water usage remains below the current limit' (CoCT 2021c). WCWC members argue that this new approach fails to address underlying issues relating to water access (Scheba et al. 2021). These include water-billing issues being unresolved when households dispute high bills, household leaks being unresolved and disagreement about whether the allocated amount is adequate when multiple households live in backyard dwellings.

EMG argues that the ongoing failures in access to water and sanitation by poor households indicates the need for a fundamental change in approaches to governance and community engagement. Put simply, there is a 'continued failure of the City of Cape Town to address the needs of a growing population of poor residents' (Enqvist

et al. 2020). A new understanding of governance is needed in the context of climate change, such as 'transformational adaptation', to ensure that a just and resilient future is possible. Transformative adaptation acknowledges that climate change is not a stand-alone issue but combines with other drivers of change such as urbanisation (Taylor et al. 2019). Giacomo Fedele and colleagues (2019) illustrate examples of transformative adaptation, including 'the revitalization of rivers and relocation of human activities in flood plains (as opposed to building channels and dikes)' and 'the creation of multi stakeholders' committees for managing water use quotas during scarcity (compared to top-down decisions)'.

The prevailing technocratic approach may work quite well as an approach to water management, in terms of water supply and demand, but it fails to sufficiently consider lives and livelihoods and thus to meet people's fundamental needs for equitable access to water and sanitation. This approach serves the needs and interests of wealthy households in the leafy suburbs, where concerns are heard and responded to. A genuinely transformative governance approach would seek to negotiate and resolve underlying issues in poor communities as well. Issues around WMDs in Cape Town illustrate a clash of realities around how leaks should be fixed and billing should take place at a household level. Instead of there being communication on how issues such as household leaks could be fixed in the complex lived reality of poverty, people are stuck with a punitive approach. Johan Enqvist and colleagues (2020) argue that this relates to authorities' tendency treat all citizens as if they do or should live in a formal context in order to access water services.

COMMUNITY RESILIENCE IN CAPE TOWN PROJECT

Given the challenges outlined above and the desire for change, activists, NGOs and academics established the Community Resilience in Cape Town project to explore ways of resolving issues in the contested context of water governance. The project is a transdisciplinary collaborative process between the Western Cape Water Caucus, EMG, the African Climate and Development Initiative at the University of Cape Town and the Centre for Complex Systems at the University of Stellenbosch. As activists for dignified water access, members of the WCWC were keen to conduct research within their respective communities. Discussions among the project partners led to use of the SenseMaker tool to conduct research in the city's townships. SenseMaker is a process where researchers collect respondents' experiences in narrative form using a cell phone application, then compile data and insights from the large number of stories gathered. A total of

311 stories were collected across Mitchells Plain, Green Park, Makhaza, Khayelitsha, Dunoon, Jo Slovo and several other areas. These areas include both formal housing and informal settlements.

The narratives gathered by the WCWC researchers highlight recurring challenges:

- I'm very, very angry. I have a WMD which was installed, without my consent. Now I'm facing a huge water bill and I have reported [my broken device].
- [The WMD] kept leaking water and my water [allocation] would run out quickly. My husband asked a plumber in our area, who charged us R200 to fix it so we have water.
- Living in an informal settlement, we once as a community asked municipality to put up a tap closer to our houses. The results were positive.
- Nothing has changed for the better [with the WMD], it has gotten worse: there are days when there's no water. The water bills are sky high and I don't understand why. I have gone to the council to report but for two years no one has come to help.

SenseMaker findings

The findings highlight a number of problems faced by marginalised communities in Cape Town. The most common water issues that respondents reported were in relation to billing (45%) and leakages (32%). Sixty-four percent of respondents reported that their problems were ongoing and never resolved, while only 14 percent reported that problems were satisfactorily resolved. The results show a clear breakdown in getting a response to service delivery issues when reported, highlighting a major disconnect between citizens and government. For a comprehensive overview of the SenseMaker process and results, see EMG (n.d.).

Use of the SenseMaker findings

Late in 2019 workshops were held in the communities where the research was undertaken to share the SenseMaker findings with research participants and City of Cape Town officials. One workshop included positive engagement with CoCT officials regarding the findings. The citizen researchers appreciated that CoCT officials were finally hearing and responding to the concerns they raised. There was an agreement that further engagements would take place between the CoCT and WCWC members to

explore ways of resolving some of the problems discussed, such as dysfunctional WMDs and high water bills. The pandemic delayed the engagements until December 2021. CoCT officials have now committed to investigating specific billing issues raised by the WCWC from a sample of 10 houses to ascertain the cause of the problems reported and how they might relate to more systemic issues.

DISCUSSION

Governance

The research found that governance systems tend to focus on a city-wide scale. Clearly this is important, as it seeks to maintain water supply throughout the city, with its 4 million customers. This also makes the CoCT quite effective in responding to infrastructure failures that occur at a localised level, regardless of where they take place. However, there are significant shortcomings in governance systems, where systemic issues affecting thousands of households across multiple areas are poorly addressed.

The SenseMaker process is an example of how engagement can build governance that is responsive to issues on the ground. In this instance, citizens were enabled to conduct their own research, present it to city officials and look at how to practically make a difference.

In a water governance system that better served poor communities, city officials would listen to the lived experience of community members and engage in dialogue with them on these issues. People would have opportunities to describe issues affecting them, and officials would be able to describe the constraints they operate under. Successful engagement could resolve billing issues before they run into the tens of thousands of rands, WMDs could be replaced when they are faulty, citizens could better understand the billing system, households could identify and fix basic leaks quickly and they and officials could find compromises enabling plumbers to fix more complex leaks without households' being charged. Similar dialogue could help solve other governance issues, such as access to electricity, waste management and housing.

When such issues are not addressed, the disconnect and distrust between people and government grows, which is exactly the opposite of what is needed for a just transition. If people cannot effectively work within the system, they are much more likely to work outside of it, with bypassed meters, illegal water connections and the like. As Maria

Kaika (2017) argues, governance should look for breakdowns and channel energy into resolving these emerging issues, rather than relying on technocratic approaches, such as the use of indicators.

The disconnect between government and citizens is graphically illustrated by the political violence that occurs in local politics. EMG has consistently seen how political patronage and power politics has created a culture where citizens are actively prevented from raising dissenting points and often face violence and intimidation when trying to address concerns of local communities. For example, during the pandemic this led to political killings, such as that of an Mfuleni community leader who sought to distribute food parcels (Mtabane 2020).

COVID-19 context

The COVID-19 pandemic can be studied as a prolonged period of extreme societal stress to better understand the implications of such a crisis for a just transition. Early in 2021 EMG began studying pandemic experiences in relation to the just transition, focusing on issues related to water and sanitation (Kulundu-Bolus et al. 2021). The pandemic powerfully illustrated the predicament South Africa faces in ensuring equitable access to water and sanitation. The national government quickly noted access to water as vital for people's ability to wash their hands and keep social distancing while queuing for water. It initiated a programme to deliver water tanks and tankers to underserved areas, including schools, informal settlements and rural areas. The CoCT then provided

water and sanitation services in so-called unrecognised informal settlements. The City made clear, however, that 'these temporary services were intended for the duration of the lockdown regulations related to the COVID-19 pandemic and [were] not intended to continue thereafter' (CoCT 2021a).

Unfortunately, this illustrates that the government saw the need for improved access to water as only temporary, rather than as a systemic deficiency to be addressed.



CONCLUSIONS AND RECOMMENDATIONS

A just transition demands that systems be put in place to ensure genuine dialogue between *all* citizens and government. The SenseMaker findings show that when people cannot resolve issues with government, when they are marginalised and unheard, they resort to bypassing systems and alternative arrangements to access water and sanitation. Despite the frustrations and anger from activists regarding poor access to water and sanitation, WCWC members remain committed to engaging with government to resolve the issues faced in communities across Cape Town. Increased engagement between the CoCT and the WCWC in 2022 could start to rebuild trust and identify ways to ensure sustainable and equitable access to water.

The just transition has to be understood as the movement to a far more equal society that doesn't leave the majority of people behind. Currently the reassuring visions of government climate change response strategies tend to remain aspirational and give no clear direction on how governance must and will be changed as a fundamental part of the response. The city's climate change action plan includes the principle of 'innovation and transformational planning' but as yet offers no definition of 'transformational planning' or how it will be achieved. Until the need for transformation is clearly articulated, it is difficult to see how the CoCT or South Africa will achieve the laudable goal of ensuring 'that all Capetonians are able to live in well-located, energy-efficient and climate-proof housing, are easily able to access safe and affordable transport, have affordable high-quality water, sanitation, refuse collection and clean energy, and enjoy a healthy local environment, with access to green spaces' (CoCT 2021b).

Our experience with the SenseMaker process documents the disconnect between people's lived experiences in poor communities and the narrative that the City of Cape Town is a well-functioning city. A just transition will require a fundamental overhaul of the way government engages with citizens, so that choices are informed by genuine participatory engagement with them. This essay has focused on water issues, but the underlying concerns also apply to other areas, such as land access, electricity, waste management, housing and so on. The adage 'Nothing about us without us' has to be the core principle around which any change interventions take place.



Climate Change Adaptation Finance as an Enabler to Building Resilience among Smallholder Farmers

Dr Sibusiso Nxumalo, Climate Finance Specialist Advisor, International Development Group



The latest climate science reaffirms that global catastrophic weather conditions in the past decade can be attributed to climate change (IPCC 2021a). Climate change, in turn, presents sustained threats to global food and water security (CGIAR 2012). Food production systems are threatened by extreme disturbances in weather patterns, manifesting as increased frequency of droughts and floods (Busby 2021).

Climate resilience is critical to ensuring food security. In the context of weather and climate, *resilience* refers to the ability of a system, community or society to cope with and recover from the adverse effects of climate-related hazards and to adapt to long-term changes without undermining food security or well-being (Pasteur 2011a). Smallholder farmers produce approximately a third of the world's food (FAO 2021) and are therefore critically important to food security, yet they receive the least finan-

cial support from climate finance agencies. Africa is home to an estimated 33 million smallholder farms, contributing up to 70 percent of the continent's food supply (IFAD 2021). Furthermore, women account for 60 percent of Africa's food production and are often disproportionately affected by climate change (OXFAM 2017; Schalatek and Nakhouda 2018).

The uMgungundlovu District Municipality (UMDM) in South Africa, located in the KwaZulu-Natal Midlands, comprises seven local municipalities and is home to many smallholder farmers.

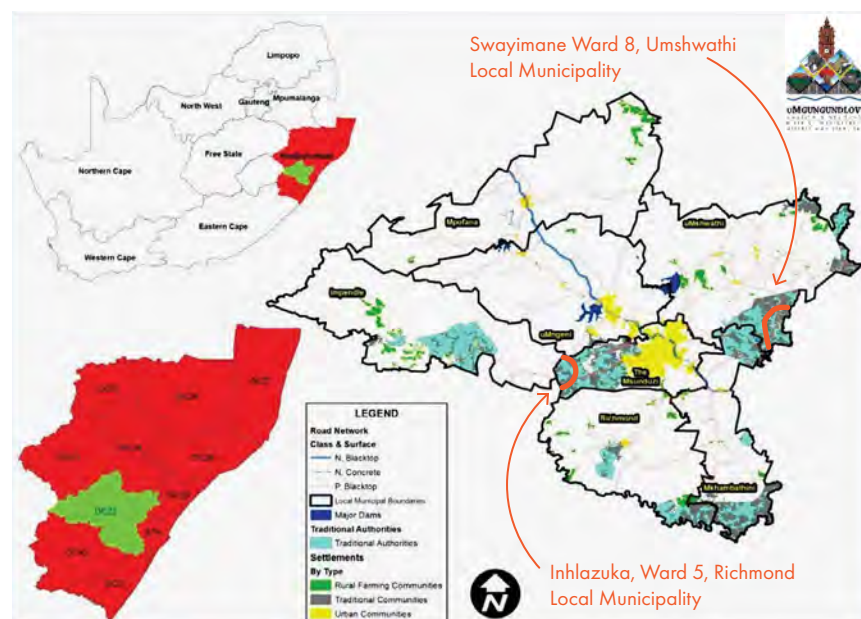
Climate hazards that affect local communities in uMgungundlovu District include severe storms, flash floods and droughts (SANBI 2014). The Standardised Precipitation Evapotranspiration Index, used by the South African Weather Services to measure precipitation, evapotranspiration and drought, including long-term rainfall observations, has predicted severe ecological impacts and a warmer future for the uMgungundlovu region (Botai et al. 2016).

The uMngeni Resilience Project (URP) in UMDM aims to increase the climate resilience of smallholder farmers in the area by employing three key interventions: early warning systems, climate-smart agriculture and climate-proofing settlements. Research on the impacts of the URP have revealed that climate adaptation finance enables smallholder farmers to build resilience to climate change (Nxumalo 2021; Jiri et al. 2017; Busby 2021).

AIM AND STUDY CONTEXT

The URP aims to reduce the vulnerability of farming communities and small-scale farmers in the UMDM to the impacts of climate change. Best practice is to increase climate resilience and adaptive capacity by combining traditional and scientific knowledge in an integrated approach to adaptation (SANBI 2014). In the UMDM, a set of complementary interventions were implemented to enhance resilience. These interventions focused on early warning and ward-based disaster response systems, the use of climate-resilient crops and climate-smart techniques in new and existing farming systems, disseminating knowledge about adaptation and implementing policy recommendations (SANBI 2014).

Figure 1 • uMngeni Resilience Project Sites



Sources: SANBI (2014); Statistics South Africa (2011).

The URP was implemented in two sites in the UMDM, one of the 11 district municipalities in KwaZulu-Natal Province. The UMDM has a total area of 9,513 square kilometres (km²), and almost 40 percent of its land cover is agricultural land. The municipality provides potable water to the almost half of the KwaZulu-Natal population (more than 5 million) that lives within the greater Durban–Pietermaritzburg areas. The first study site was Ward 8 of Swayimane under the uMshwathi Local Municipality (UMLM), which covers an area of 32.9 km² and has an estimated population of 6,856 (53 percent women), a density of 213 people per km². The second study site was Ward 5 of Inhlazuka, Richmond Local Municipality (RLM), which covers an area of 103 km² and has an estimated population of 8,867 (55 percent women), a density of 86 people per km². The rural sites were selected for their high level of poverty and associated vulnerability to the predicted impacts of climate variability and for the support of traditional authorities who embraced the URP (SANBI 2014; Statistics South Africa

2011). Income and livelihoods in both communities are largely derived from subsistence farming. Dominant farming systems include cropping and animal husbandry on gently sloping land. Farmers grow maize, beans, amadumbe (taro), sweet potato and sugarcane. The area is characterised by good rainfall (500 to 800 millimetres per year), predominant fog and deep soils (SANBI 2014; Statistics South Africa 2011).

METHODOLOGY

The data collection process was guided by two frameworks: ‘vulnerability to resilience’ and ‘climate vulnerability and capacity analysis’ (Pasteur 2011a, 2011b; CARE 2009). These tools recognise individuals and communities as being vulnerable to climate change in several ways. The study adopted a mixed methods approach, with data collected using a questionnaire and focus group discussions. A total of 61 respondents (beneficiaries of the URP), composed of farmers from Swayimane (36) and Inhlazuka (25), were randomly selected and purposively selected, respectively. Of all the respondents, 48 (78.7 percent) were female, and 44.3 percent were between 46 and 60 years old, and 37.7 percent were over 60. In addition, farmers took part in four focus group discussions (two in each research site) to explore other factors that help build resilience and to identify the benefits of climate finance.

RESULTS

The South African National Biodiversity Institute (SANBI) and the uMngundlovu District Municipality obtained US\$7.5 million from the Adaptation Fund to implement four components of the uMngeni Resilience Project. For component 1, \$945,737 was allocated for early warning and response systems to improve preparedness and the adaptive capacity of local communities and small-scale farmers, while \$3,197,307 was allocated for component 2, climate-proof settlements. The University of KwaZulu-Natal was awarded \$2.11 million to implement the climate-smart agriculture (component 3) and capacity-building (component 4) interventions. The university identified small-holder farming groups and then financed adaptation interventions for them in the two settings: Swayimane and Inhlazuka.

The results indicated a considerable relationship between building resilience to climate change and access to adaptation finance. In both study sites, adaptation finance obtained from the URP supported the procurement of agricultural inputs, the establishment of climate field schools, the provision of low-cost adaptation technologies, and capacity

building, including training on climate-smart agriculture. Farmers in Swayimane and Inhlazuka practiced adaptation methods learned through the climate-smart agriculture training programme supported by the URP. Challenges that farmers mentioned included the shortage of water to irrigate their crops.

“ Water shortages are sometimes a real problem in this area of Inhlazuka; we sometimes use water from the stream to water our fields, but not everyone has access to a nearby stream, and those living further away from streams face major challenges from time to time.

—MaZwide (Inhlazuka)

“ We uproot crops that are not drought-tolerant once we’ve seen that they are not doing well.

—MaMngadi (Swayimane)

“ We dig trenches and furrows in our plots so that water is able to run off with minimal crops being washed away.

—MaGogo (Swayimane)

In response to these and other challenges that farmers said they face, the University of KwaZulu-Natal designed a training programme on climate-smart agriculture. The first method that farmers learned and practiced was the use of the ‘A-frame’ to mark and plant following horizontal or contour lines, and the digging of trenches to keep water underground and reduce run-off. The intent of this method was to reduce soil erosion and conserve rainwater underground. This method was more favoured by farmers growing crops in sloped landscapes. The second favoured method was the use of recycled grass cuttings and the minimal tilling method to conserve soil moisture. The third adaptation method encouraged the use of drought-resistant crop varieties to reduce vulnerability to climate change. Farmers with greater access to climate information and adaptation strategies through extension services were more likely to adapt to climate change (Nxumalo 2021).

Agricultural inputs included seedlings, such as of bambara groundnut, cowpea, sorghum and millet. It will be crucial to develop seed production and storage systems for the identified crops, as well as soil preparation and cropping systems that are tolerant of climate risks. Other interventions included identifying water storage and irrigation systems, and providing equipment such as tractors, fencing tools and harvesting tools (hand hoes, garden forks, etc.).

Farmers with greater access to climate information and adaptation strategies through extension services were more likely to adapt to climate change.

In Swayimane, SANBI and the UMDM allocated adaptation funding in partnership with the University of KwaZulu-Natal to purchase and install an automatic weather station and an early warning lightning detection system to help the local community build resilience against climate hazards such as lightning. Seasonal harvesting influenced farmers’ decisions on food consumption and the marketing of agricultural produce. Poor harvesting seasons influenced crop prices and the likelihood of selling produce at the market. Unfavourable climatic conditions such as drought threatened livestock and crop production, thus reducing smallholder farmers’ resilience to climate change (Nxumalo 2021).

Additional determining factors shown to help smallholder farmers better adapt included access to climate information, education (level of schooling and training received) and the application of climate-smart agriculture methods³. The education level of the household head, the farm size and the employment status of the household had no significant influence on adaptation to climate change. Focus groups revealed that education increased awareness of climate change, and regular access to weather information determined how smallholder farmers made informed farming decisions. Access to training enabled smallholder farmers to plant legumes for nitrogen fixation and soil rehabilitation. From the discussion, households with access to livestock appeared to have notably higher adaptive capacity.

Moreover, the URP described interesting lessons that contribute to policy planning and implementation. Women were more vulnerable to the effects of climate change due to their significant involvement in agricultural activities. *Vulnerability* in this context means exposure and susceptibility to the negative effects of climate change. Smallholder farmers played a limited role in how project funds were allocated and spent. There was no existential relationship between gender and awareness of climate change, suggesting that gender did not directly influence perceptions of climate change (Nxumalo 2021).

A just transition within the agriculture sector should be at the centre of climate policy in South Africa, with real inclusion of smallholder farmers and farming communities (See and Wilmsen 2020). A just transition in the agriculture sector should lead to the

creation rather than the loss of jobs, and it should reduce poverty and inequality. It should address women's unequal position in society by increasing their access to land, education, finance, credit, food and health care, all of which build resilience. A just transition for adaptation is vital to ensuring the well-being of women amid resource scarcity and other stresses caused by climate change or by maladaptation, which can exacerbate conflict (Malloy and Ashcraft 2020).

CONCLUSION

Reducing the injustices embedded in the food and agriculture system will require a just transition and a resilient path in the agriculture sector. To build resilience to climate change, we must shift to more sustainable food systems that work for smallholder farmers, individuals and communities. The results of this study show that smallholder farmers in Swayimane and Inhlazuka can take action to strengthen their capacity to adapt to climate-related hazards and shocks. In addition, the results indicate a need to provide climate information through various extension services to increase climate resilience.

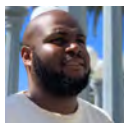
Farmers appreciated the adaptation methods they learned from the climate-smart agriculture training, which helped them better cope with climate shocks and stresses. These included adjusted planting dates to maximise crop yields, enhancing water- and soil-conservation methods, increasing crop diversification, increasing access to agricultural inputs (pesticides and fertilisers) and greater use of improved crop varieties. In vulnerable rural communities within the UMDM, economic, sociological and technological interventions can make the management of drought and flash floods more effective. Moreover, women's participation in project activities was factored into project indicators and targets to help them build resilience. Smallholder farmers played a limited role in the management of adaptation funds, particularly in terms of how funds were allocated and spent. Hence, access to a comprehensive range of financial services remains a substantial challenge for smallholders. Institutional support mechanisms coupled with policy and technological interventions are needed to promote indigenous adaptation strategies that smallholder farmers and female-headed households can use to enhance their resilience.





Renewable Energy Solutions to Support South Africa's Climate Adaptation and Resilience Efforts

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Climate change is a global environmental threat, and its effects are likely to exacerbate over the coming decades. While mitigation efforts (attempts to reduce the emissions of greenhouse gases and prevent the most menacing outcomes of climate change) are critically important, many effects will not be avoidable, requiring us to adapt. On a practical level, many of our most common human activities, such as growing and making things or getting from one place to another, involve releasing greenhouse gases. The modern, more energy-intensive lifestyle is expected to be adopted by increasing numbers of people in the world. This includes Johannesburg, expected to be a megacity (more than 10 million inhabitants) by 2030 (Munich RE Group 2005; Canton 2011). While rising living standards are good news, if not properly regulated they can also increase our carbon footprint and thereby worsen climate change.

As a developing country, South Africa is pursuing socioeconomic development priorities which aim to create jobs, reduce poverty and improve human well-being, health and education. It is important that the country position itself in a new low-carbon economy. A just transition may be challenging in its early stages, but is essential, fuelled by global warming and impending climatic catastrophe that may become irreversible and impossible to recover from. If the transition is well-managed, particularly when developing clean energy systems, 'we will all share in the benefits of affordable clean energy, healthy air and enough food to sustain us all', as David Attenborough put it in his speech at the 26th Conference of the Parties (COP26) (IEA 2021).

This essay captures the diverse considerations policymakers need to take into account when planning for affordable and just energy transitions.

THE SIGNIFICANCE OF ENERGY ACCESS AND ENERGY EFFICIENCY

It goes without saying that access to energy forms the basis for human civilisation. Energy-fuelled services, such as communications, cooking, lighting, household cooling and heating prove indispensable in enabling human development and meeting their fundamental needs at the base of the Maslow pyramid (Maslow 1987). Moreover, energy, when produced cheaply and delivered efficiently, is key to sustainable economic





development. History indicates that societies have moved from one energy source to another because the new alternative source was cheap, efficient and even more powerful in output or ‘social good’. Energy efficiency, while essential, is also therefore the mother of invention. For example, humanity transitioned from wood to coal because more light and heat could be derived from the latter (Smil 2010).

A JUST ENERGY TRANSITION TO A LOW-CARBON ECONOMY

The relationship between energy and economic growth helps us understand why access to energy is so important to human development (Smil 2018). When community institutions such as local government buildings, health centres, schools and recreational facilities have access to affordable energy, they are better able to promote a just transition, attract more support from the community and improve the quality of life (Legros et al. 2009; Practical Action 2010). Expanding access to energy is just, inclusive and systemic, as it reflects diverse priorities and requires an amalgamation of technologies, policies, abilities, finance and resources.

A just transition will require that energy be accessible to all. Greater access to energy facilitates transformational changes in social and economic development. Although it can increase energy demand and unsustainable consumption patterns, and thus emissions, even limited access to modern clean energy can provide important benefits to energy-impovertised communities in areas such as health care, agriculture, biodiversity, income diversification and education.

A just transition will also require that energy be affordable. Access to affordable energy will contribute to decent jobs for most workers, guarantee important social protections and human rights, increase productivity, and create new opportunities for disadvantaged communities (Lowitt and Makgetla 2021). The declining cost of renewables will promote just and inclusive access to energy. Cheaper forms of renewable

energy also allow individuals and regions that have been trapped in the fossil fuel economy to benefit from a just transition.

ENERGY ACCESS AND AGRICULTURE

In the current economic climate, South African farmers are the group most affected by climate change. In the Northern Cape Province, increased floods and droughts threaten farmers with economic ruin. In other breadbasket areas, such as the Free State, crop failure associated with unpredictable weather patterns could bring a spiralling decline in food production and increasingly narrow the ‘social window of food security’ (Haile 2005; Thomas et al. 2007). Western Cape, which contributes 22 percent to national agricultural gross domestic product, is another province that may experience dire economic consequences. Agriculture and agro-processing are responsible for about 18 percent of employment opportunities. The drought in 2016–17 led to a loss of more than 20,000 jobs in Western Cape’s agricultural sector. Farmworkers in the province are unlikely to be employed elsewhere, so these job losses will worsen poverty (Kalaba 2019).

To mitigate risks faced by the agricultural sector, various adaptation options need to be tested, and this requires access to knowledge and information. Energy-powered information technologies such as radios, televisions and cell phones can provide valuable

The declining cost of renewables will promote just and inclusive access to energy.

information to farmers, notifying them about new drought-resistant varieties, different farming methods or seasonal weather forecasts (Ojha et al. 2015). Machine learning can help predict weather or the adverse effects of climate change for towns and cities, allowing them and their inhabitants to take shelter, prepare and plan (Balogun et al. 2020; Mallet 2021). Data collected by machine learning algorithms can also be used to enhance the efficiency of renewable systems. For example, during floods or heavy rains, hydro systems can be used more effectively. Renewable energy in itself is not sufficient to supply the information currently unavailable to or withheld from a group.

Since the production of field crops consumes a significant amount of energy, energy prices affect the costs of production. However, to bring the desired benefits in food security, productivity and rural economic development, improving energy services for farmers should include increasing the energy input to agriculture. Agriculture is perhaps the sector best poised to benefit from clean energy access, through strengthened climate change adaptation and mitigation, invigorated economic growth and job creation.

MAXIMISING RENEWABLE ENERGY

A just transition will require increased energy access to drive economic and human development. However, efforts need to ensure that supplementary energy is affordable, reliable and clean. Affordable clean energy can be ensured by maximising renewable energy potential across different regions, by capitalising on topography, natural resources, location and available technology. For example, some provinces might rely heavily on wind, while others might have more potential to generate solar or hydropower. Combining several sources of renewable energy is one of the most important strategies for ensuring a steady supply.

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ADAPTING TO A WARMER WORLD WITH CLEAN ENERGY

The changing climate is going to force us to consider entirely new needs, as we seek to adapt to a warmer world while avoiding maladaptation. In addition, we need to recognise that power systems will be vulnerable to the changing climate. Both the supply and demand of energy will be affected by climate change. The risk of damage to transmission lines will increase with more frequent and extreme events such as storms, cyclones and floods. One such event was experienced on 24 January 2021, when Tropical Cyclone Eloise swept large regions of the country, bringing heavy rainfall and flooding with strong winds (Zhongming et al. 2021). Heat waves will also increase the demand for electricity for cooling. These extreme events will have a direct impact on energy supply infrastructure, regardless of whether they are produced by fossil fuels or renewable energy. Thus, the climate-proofing of buildings shouldn't be the only priority; alternative energy systems should be considered as well. Adaptation to a warmer world will be expensive, so the economic feasibility of climate-proofing renewable energy systems should be discussed. Currently, the most affordable power systems are based on solar, wind, battery energy storage and hydro.

Educating the public about possible solutions, including where support can be accessed, can help society adapt to the new circumstances. We should invest in technologies that have greatly widened the scope and improved the speed of communications. Most of these technologies need electrical power and can be promoted through community-level renewable energy projects. Access to clean energy will be vital, as it allows for broad economic and social development by powering agricultural, commercial and industrial activities. People have a greater capacity to adapt if they are well informed, healthy and financially secure.

BEING REALISTIC ABOUT INNOVATION AND THE INEVITABLY SLOW PACE OF ENERGY TRANSITIONS

Modern societies are increasingly looking to innovation as a catalyst for development. Society believes innovation will unlock every imaginable portal: from enabling self-driving cars, to consolidating machine and human consciousness, to increasing average life expectancies to beyond 100 years, to harnessing energy from wind and the sun, which are as free and green as energy can be (Smil 2006). In South Africa, coal-fired



and nuclear power stations have a total capacity of about 42 gigawatts (GW) (Heun et al. 2010). This represents 87 percent of national energy consumption, 83 percent for coal-fired stations and 4 percent for nuclear power stations (Ratshomo 2019). The young ages of some power stations, coupled with their typically long lifetimes, mean that a sudden exit from these energy sources poses an existential threat to the South African economy (Burton et al. 2019; Hochstetler 2020). We must explore new funding models provided by public-private sector partnerships to drive the transition and bridge the inevitable gaps in energy supply. Additionally, we must ensure that the transition to clean and renewable sources provides affordable, efficient energy. By using a cleaner energy blend of solar, wind and gas-fired power instead of coal-fired power stations, and by exploiting the considerable efficiencies of this energy in businesses, homes and industries, South Africa can

reduce its emissions. As power sources, wind and the sun are intermittent, but our need for electricity is not. We need electricity all the time to meet the targets of our economic growth plan or trajectory. Thus, although solar and wind will play a huge role in our ‘energy mix’, we will need additional sources for when the wind is not blowing and the sun is not shining. The two currently available options available are storing in batteries the excess electricity generated in summer and adding fossil-fuel sources that run only when they are needed, such as natural gas plants (Myhrvold and Caldeira 2012; DOE 2015). The intermittency of 100 percent clean electricity poses a major and expensive problem, but it can be solved through innovation, such as utilising properties that are informally held and whose ownership is not legally recognised by the state. This will make it easier for investors to fund projects with agricultural potential.

THE SLOW RISE OF SOLAR CELLS

Technological advancements and the falling cost of solar power and battery storage make smart mini-grids and decentralised, self-sufficient energy supplies a viable option for many rural communities (Moner-Girona et al. 2018). In fact, they are often more reliable than the national grid, and thus less exposed to load-shedding and damage to powerlines. Unlike smaller independent power systems, smart mini-grids can supply AC power, enabling people in rural areas to use devices and appliances that increase income opportunities and improve quality of life. With improved technological innovations such as smart meters and portable battery charging, electricity from smart mini-grids is becoming inexpensive (Niyonteze et al. 2019). This makes solar photovoltaic (PV) a more reliable energy source for smart mini-grids than other renewable energy alternatives. These energy alternatives should be deployed in ways that empower communities. This will help strengthen community organisation and decision-making, including creating relationships with regional stakeholders, which can empower communities to act independently in response to climate change effects. The energy transition will bring significant changes in employment, leading to the loss of existing types of jobs and creating new ones. In a just transition, the decline of some industries shouldn’t diminish workers’ rights and the quality of their work. Government, social partners and industries must collaborate to ensure that the right frameworks, re-training and social protections are in place for workers in these declining industries, as well as those in emerging and transforming sectors. Government should analyse the transition’s impacts across sectors of industry and society. This could inform the development of social and economic policy frameworks that direct finite public resources to where they will best support vulnerable communities through the transition.

WORKING ON GOVERNMENT POLICY, TECHNOLOGY AND MARKETS TO LEVEL THE PLAYING FIELD

Greenhouse gas emissions must be greatly reduced in the coming decades. For this to happen, greater policy attention is required to speed up the penetration of existing green technologies and practices, such as policies that encourage greater energy efficiency. We also must factor in ‘global markets’, assisting companies that come up with new inventions by making sure that these reach a global scale, as well as financial markets and investors to back these efforts. Technology, global markets and policies have to

work in complimentary ways, and policymakers need to be clear about the objective they are trying to achieve and the green technologies they wish to promote. Adopting a zero-emissions standard for cars, for example, will not work if no technology exists to eliminate emissions or no companies are willing to manufacture and sell cars that meet the standard (Gates 2021).

A success story where technology, global markets and policies worked together effortlessly began in the 1970s, when EU countries, the United States and Japan started investing early in solar energy research, and companies continue to make large R&D investments in the field. In the 1990s, solar technology improved, leading more companies to produce solar panels, but this technology wasn't broadly adopted until Germany lifted the market by offering low-interest loans to install panels, as well as a fixed government payment per unit of renewable electricity to anyone who generated a surplus of solar power. In 2011, the United States began using loan guarantees to fund the five biggest solar arrays in the country. China played an important role by coming up with innovations that make solar panels cheaper. Largely as a result of these countries' efforts, the price of solar-generated electricity has dropped by 90 percent since 2011 (Umbach 2010; Nejat et al. 2015). South Africa has a similar success story with its Renewable Energy Independent Power Procurement Programme (REIPPP), which has been running for over 11 years. It has achieved remarkable success, procuring over 6.3 GW of renewable energy generation capacity, with over 2.4 GW of capacity connected and feeding the national grid. Wind and solar PV projects comprised the majority of the 6.3 GW, at 5.65 GW. The renewable projects are located in various provinces, with 86 percent of the solar PV projects in the Northern Cape. Most of the wind projects are located in the Eastern and Northern Cape Provinces (Eberhard et al. 2014; Eberhard and Naude 2016). The REIPPP is well positioned to continue contributing significantly to the government's strategic infrastructure projects. Further improvement could be achieved if the South African government invested in research, collaborated with private companies by investing in their R&D projects, accelerated the demand for innovation

Greater policy attention is required to speed up the penetration of existing green technologies and practices, such as policies that encourage greater energy efficiency.



projects, reduced risks and lowered costs, built infrastructure to get green technologies to market and changed market rules to make it easier for new green technologies to compete with cheap fossil fuels.

A JUST ENERGY TRANSITION REQUIRES COOPERATION

The response to climate change will require international solidarity, not unilateralism. Such solidarity was demonstrated at COP26 in Glasgow, when some rich nations contributed about \$US8.5 billion in aid and technical assistance to help developing countries transition to a low-carbon economy in line with the Paris Agreement's ambitious objective of limiting the global temperature increase to well below 2 degrees Celsius (Sloss 2017). In the same spirit, the Komati power station in Mpumalanga, South Africa, is projected to be the first coal power plant to be repurposed to a solar energy plant at the end of its life cycle in 2022 (Broadhurst et al. 2019). If not managed, the looming threat of climate change will pose an existential threat to communities and nations. We can avoid this if we boldly and multilaterally implement global solutions. It is easy to see what is holding up the deployment of these solutions and the advancement of needed innovations. Energy is the only universal currency, and its various forms must be transformed to get anything done. Thus, ensuring access to clean energy is a good point of departure for both climate adaptation and mitigation.



ENDNOTES

1. For discussions, see Ekar (2005); Eberbach et al. (2008); Moletsane and Ntombela (2010); Perumal (2010); Nyangiwe-Ndika (2015); and Cheteni et al. (2019).
- *Shaping Ecosystem-Based and Community-Based Adaptation Policies and Programmes to Effectively Incorporate Empowerment of Women*
2. These nine dimensions or pathways to building adaptive capacity have been developed to structure the Climate Capacity Diagnosis and Development (CaDD) tool, designed to provide organisations and their networks with a systematic and repeatable approach to measure and improve their ability to manage climate change risks and opportunities. For an overview, see Barrott (2015).
- *Adapting to Drought in South African Cities*
3. The nature and cause of the civil unrest in July 2021 is contested, with continuing debates over the extent to which the widespread property destruction was instigated or spontaneous.
- *Climate Change Adaptation Finance as an Enabler to Building Resilience among Smallholder Farmers*

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