

Making the energy transition just: Assessing risk and vulnerability of mining communities

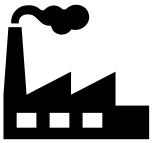
Dr Megan Cole, University of Cape Town

SAIMM ESG Conference

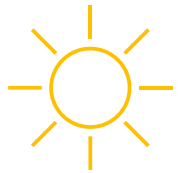
16 October 2024



Why is the just transition important in South Africa?



South Africa is the **7th biggest coal producer** in the world
- 2.8% of total (Energy Institute, 2023)



South Africa is the **14th biggest CO₂ emitter in the world**, with 1.23% of global CO₂ emissions (Climate Watch, 2021) despite being only the 39th biggest economy (IMF, 2023)

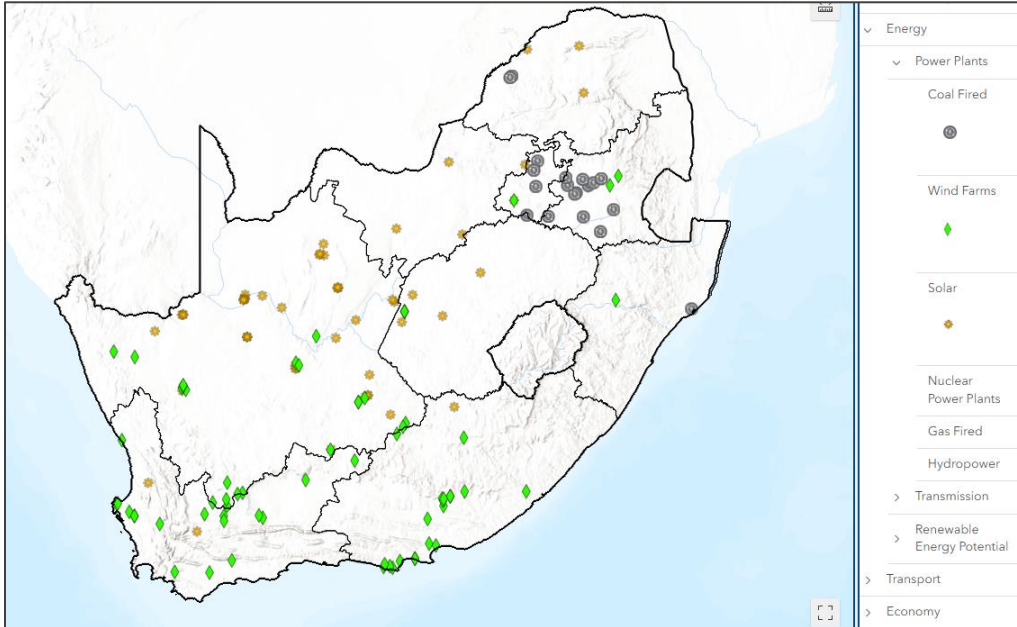


Electricity **tariffs have risen by 500% in the past decade**, impacting the poorest the hardest, largely due to coal-fired power stations megaprojects.



South Africa produces **73% of electricity in the Southern Africa Power Pool**, SAPP, established to improve electricity access in the region.

Transitioning away from coal-fired power



Map created in the South African Mine Closure Risk and Opportunity Atlas.
Data from Global Energy Monitor, 2024

Shift from coal-fired power, largely in Mpumalanga,
to renewable energy in the Cape provinces

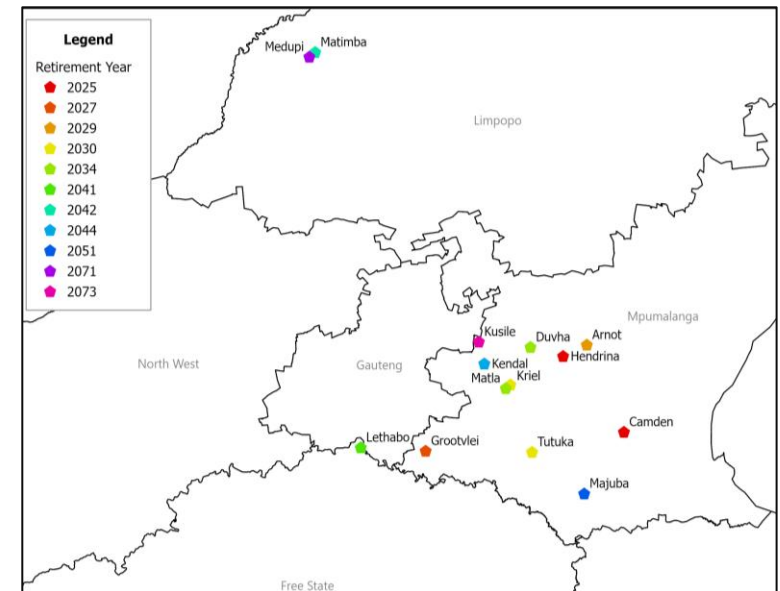


14 coal-fired power plants (41 GW) supply
81% of SA's electricity

age of plants ranges from 57 to 7 years

6 plants are due to retire by 2030

Eskom employs >10,000 people in coal
power generation



Retirement dates based on IRP 2023 – DMRE &
Eskom approved delayed retirement to 2030

Transitioning away from coal mining



Mine closure is an **inevitable part of mining**.



International pressure to mitigate climate change may contribute to **mine closures** but **other financial, economic and technical factors** are important.

Many mines are near the end of their life.



Mine closure planning is essential to minimise risks.



The **just transition** narrative helps focus in on **people and communities** but is highly contested due to the low expectations of finding jobs with similar wages and benefits, and the significant role mines play in local communities.

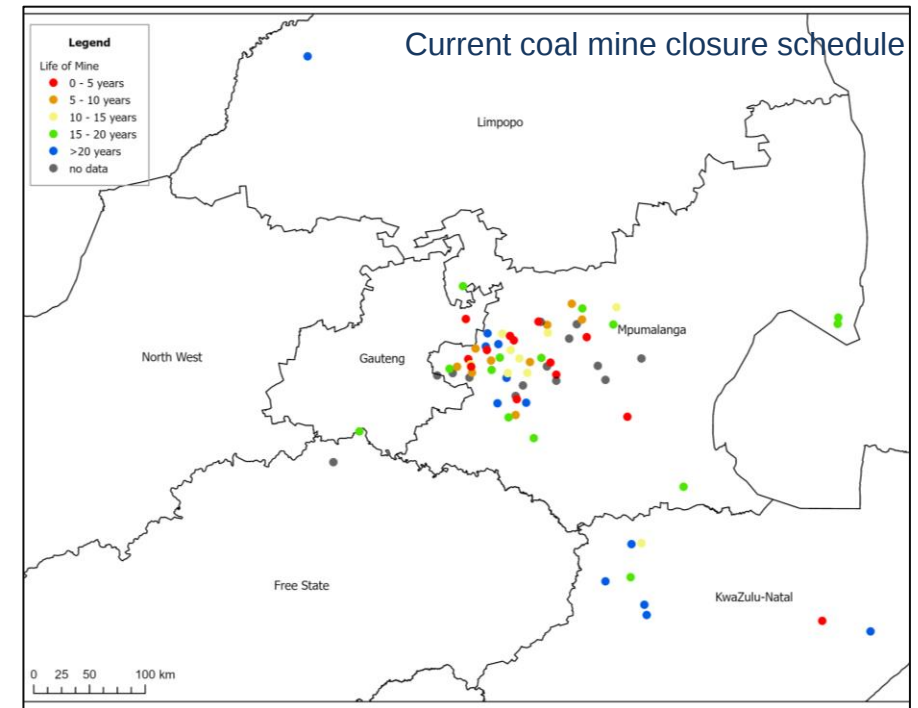
80 operating coal mines, mostly thermal coal
total production 231 Mt in 2023



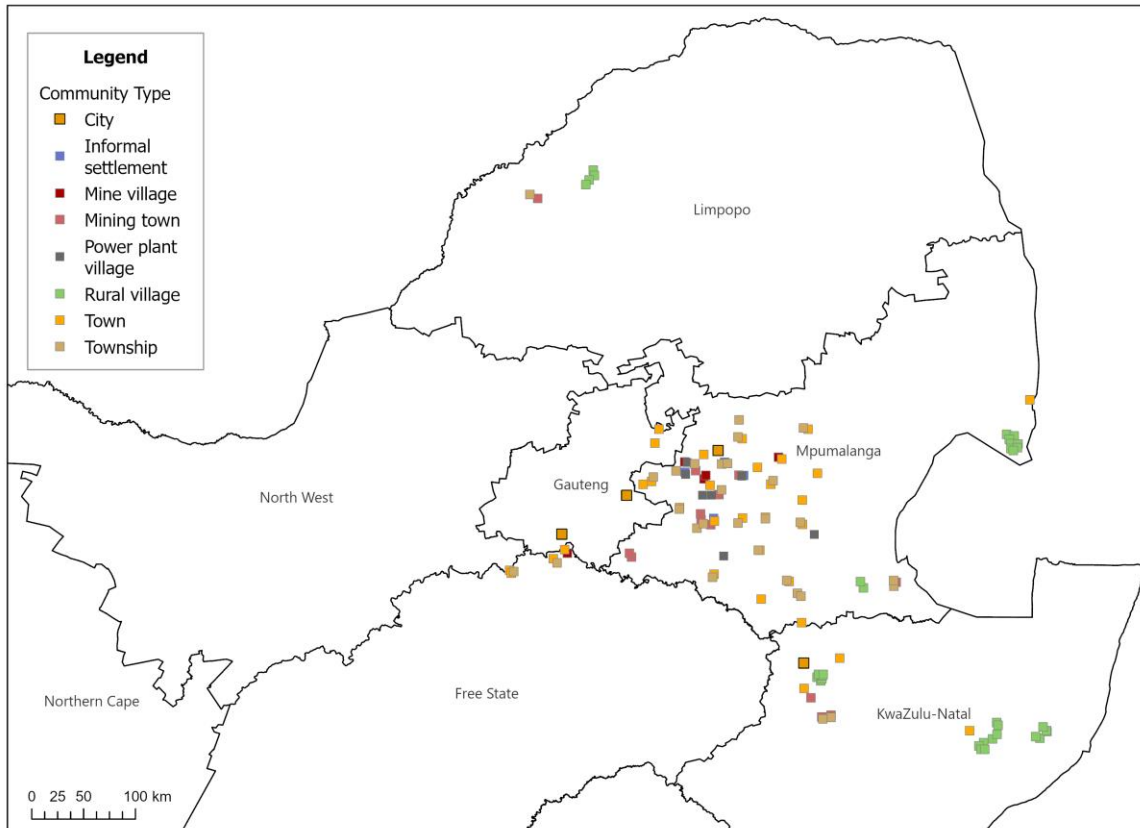
80% used locally, 20% exported

ZAR192 bn sales and ZAR3.3 bn royalties, 2023

94,531 employees in 2023 who earned ZAR 33.9 bn (USD 1.8 bn)



Coal communities



110 host communities **2.9 million people**



4 cities, 31 towns, 27 townships

10 mine/plant villages

20 rural villages

5 informal settlements

5 provinces



6 district municipalities

26 local municipalities

2 metro municipalities

Updated from Cole, Mthenjane and van Zyl, 2023. Assessing coal mine closures and mining community profiles for the 'just transition' in South Africa. J.SAIMM, 123, 6, 329-342. <http://dx.doi.org/10.17159/2411-9717/2689/2023>

Huge diversity of coal settlements and communities

Is Platinum mining facing a transition?

Platinum demand has dropped due to shift to electric vehicles, leading to lower prices and mines becoming uneconomic.



46 operating platinum mines in North West, Limpopo and Mpumalanga

largely high-cost underground mines

74% of global Pt production

181,806 employees in 2023

18 processing plants



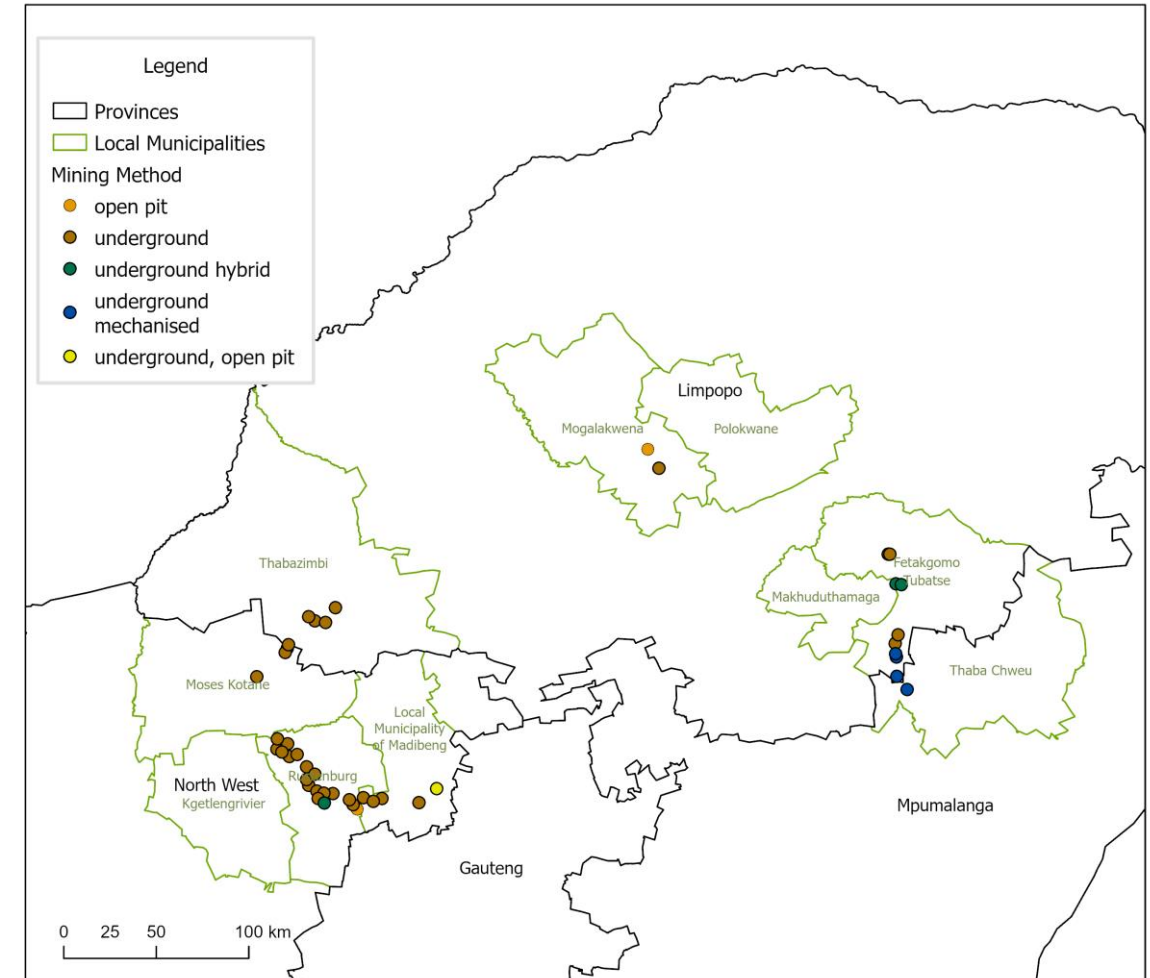
145 host communities home to
1.14 million people in 2011

1 city Rustenburg ~415,000 people

5 towns ~ 106,000 people

4 mining towns ~ 46,000 people

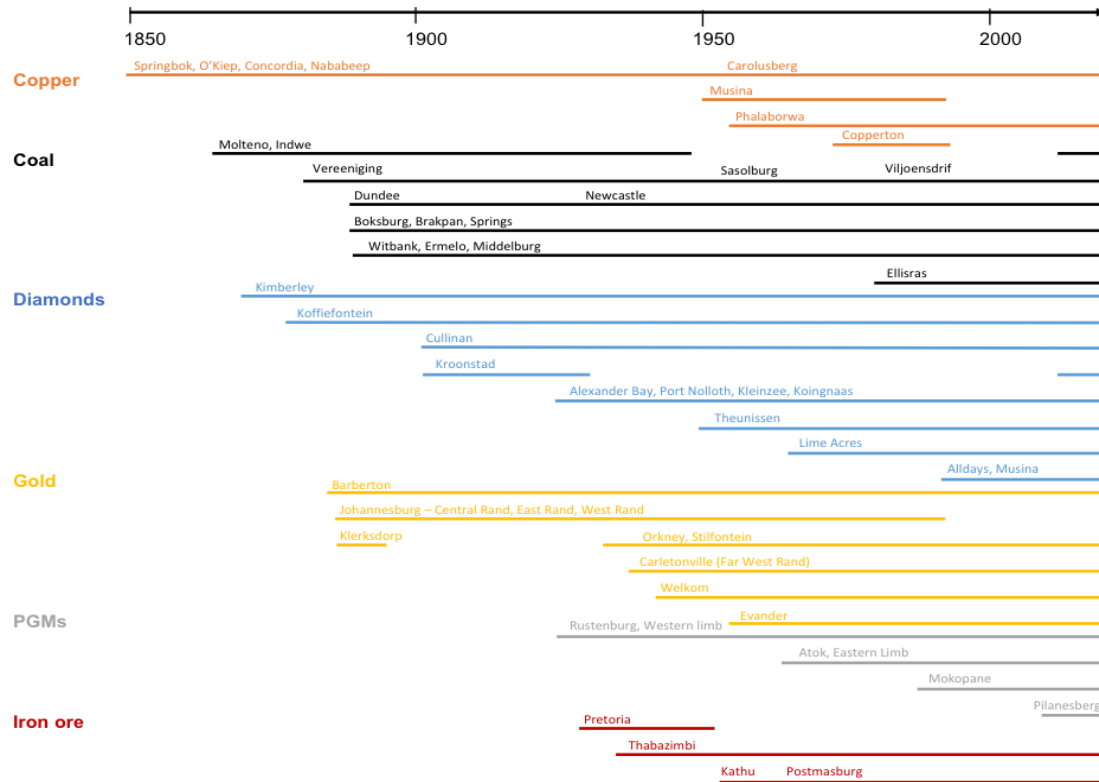
120 rural villages ~440,000 people



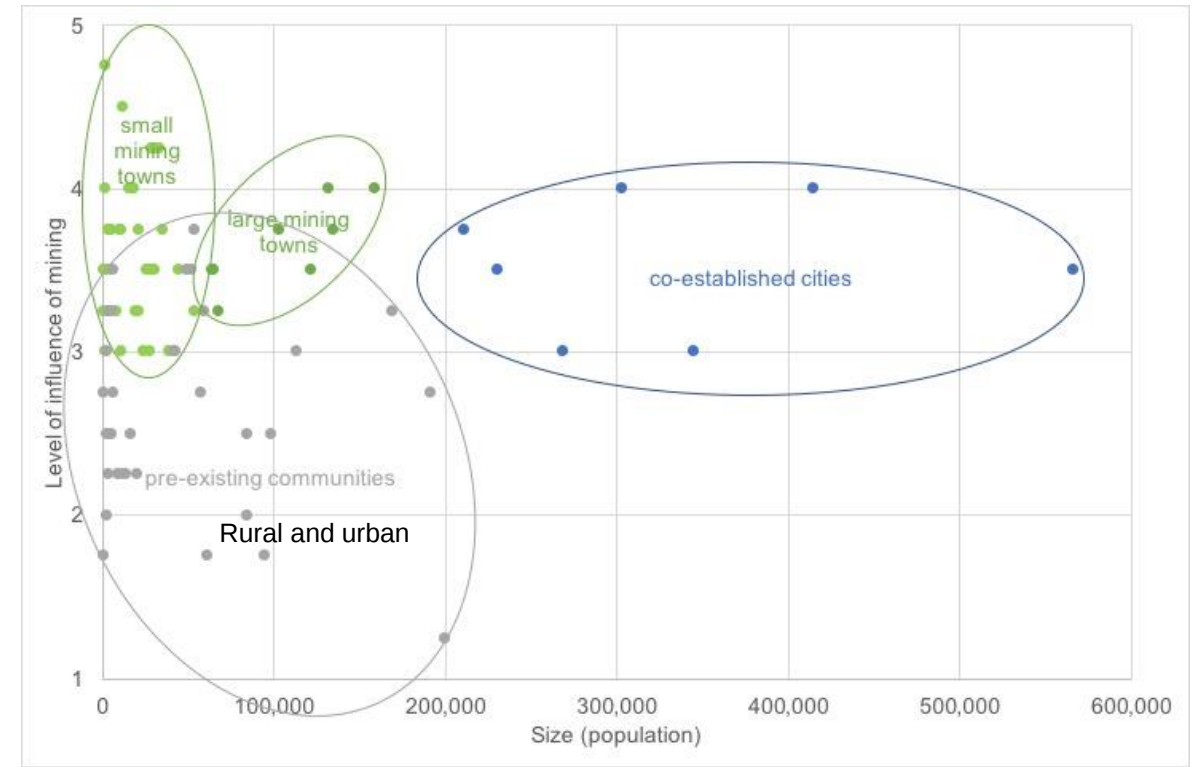
The majority of people in platinum mining areas live in rural villages in Limpopo and North West.

Understanding mining communities: history, character and the role of mining

History helps us understand the relationship between mining companies, communities and government.

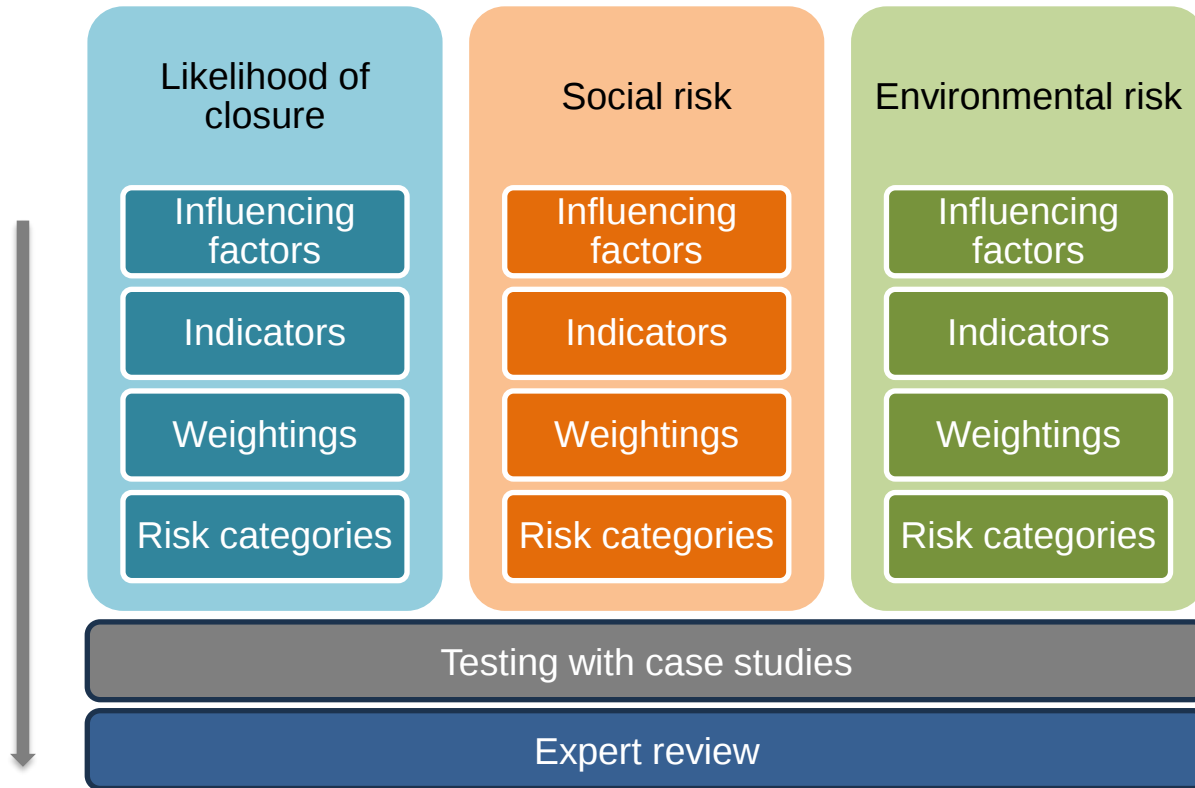


Quantitative data (population, mining duration, distance to mine, remoteness, start dates) help us categorise communities.

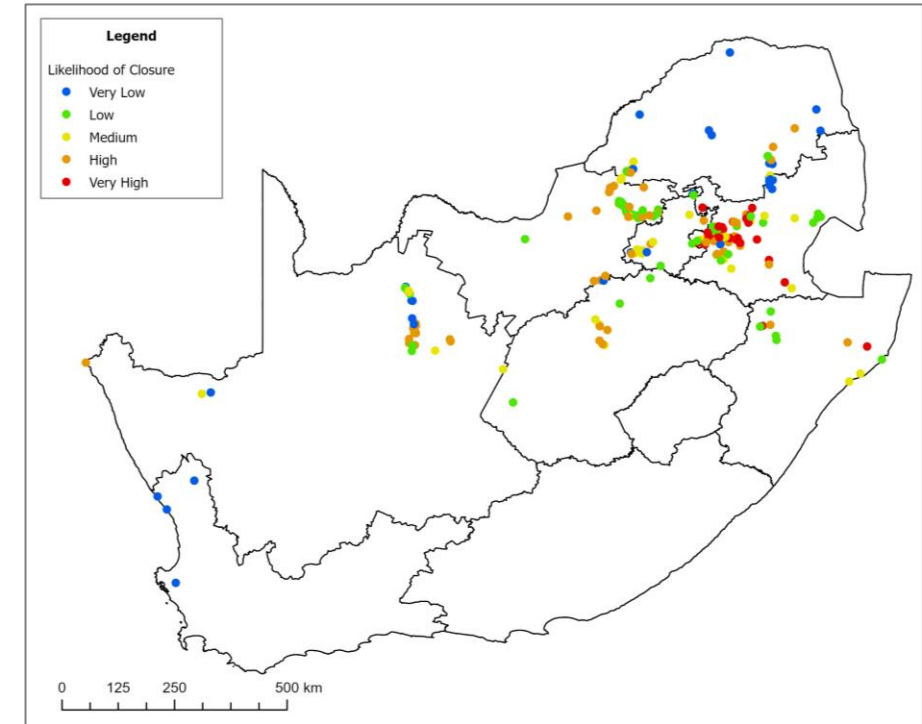


Assessing risk related to mine closure for people and places

Mine closure risk rating system



- 230 operating mines (not quarries)
- 22 commodities
- 90 mining companies



Likelihood of closure

- Very high risk in Mpumalanga coal fields
- High risk for gold mines in Free State and Gauteng
- High risk for underground platinum mines in North West and Limpopo

Social risk ratings

Influencing factors / Indicators
Population in communities
Socio-economic baseline (12 SDG indicators)
Age dependency ratio
Direct mining jobs
Remoteness (distance from a city)
Local government capacity (audit results)

Basic Services

- Electricity access
- Piped water access in dwelling or yard
- Access to toilet
- Refuse removal



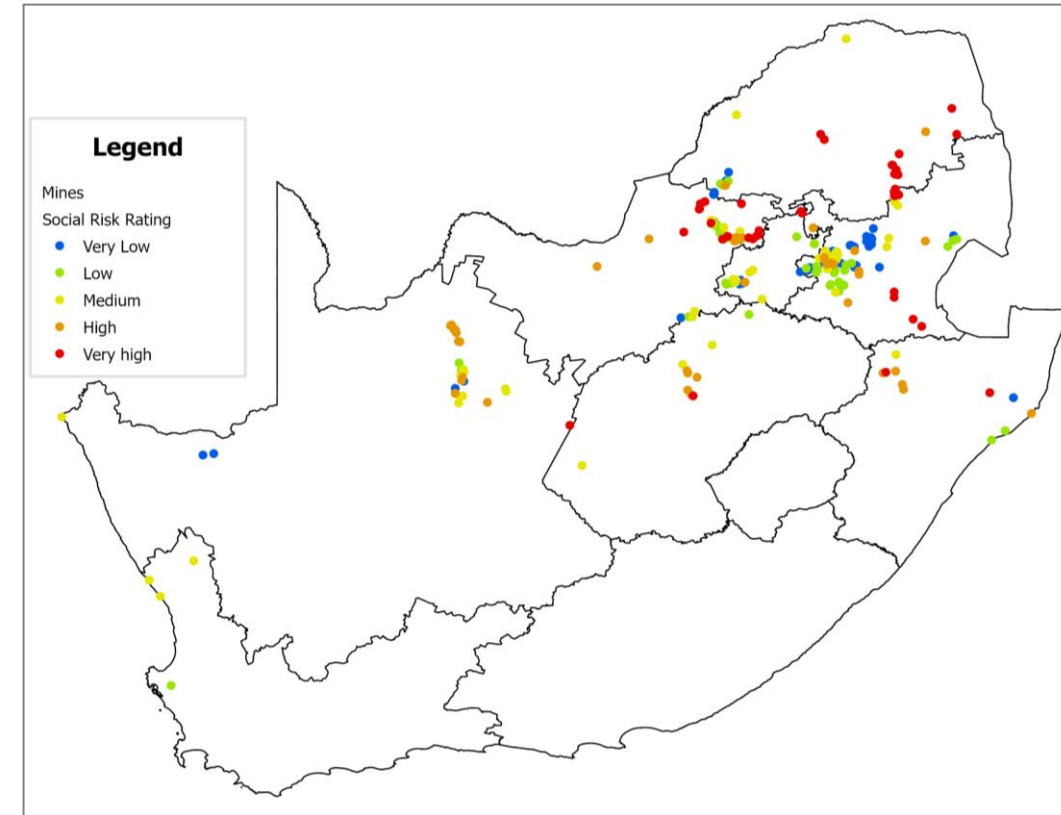
Living standards

- Formal housing
- Refrigerator ownership
- Clean cooking fuel
- Internet access
- Car ownership



Livelihoods

- Employed labour force
- Household income above upper-bound poverty line
- Secondary education completed



Most deprived areas with large mine workforce have highest risk – most notably platinum and chrome mines in Limpopo and North West

Coal communities: SDG indicators in 2011



1 NO POVERTY

38% of people living below poverty line



8 DECENT WORK AND ECONOMIC GROWTH

38% of labour force unemployed



4 QUALITY EDUCATION

56% of adults do not have Grade 12 / NQF4 education



11 SUSTAINABLE CITIES AND COMMUNITIES

15% of people do not have formal housing



7 AFFORDABLE AND CLEAN ENERGY

10% of people lack access to electricity



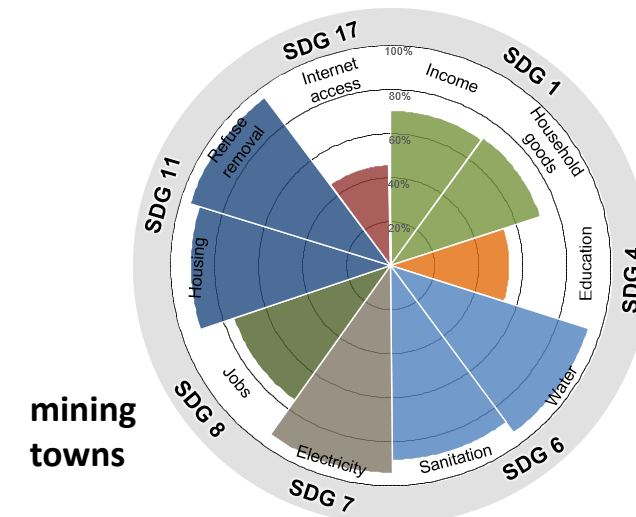
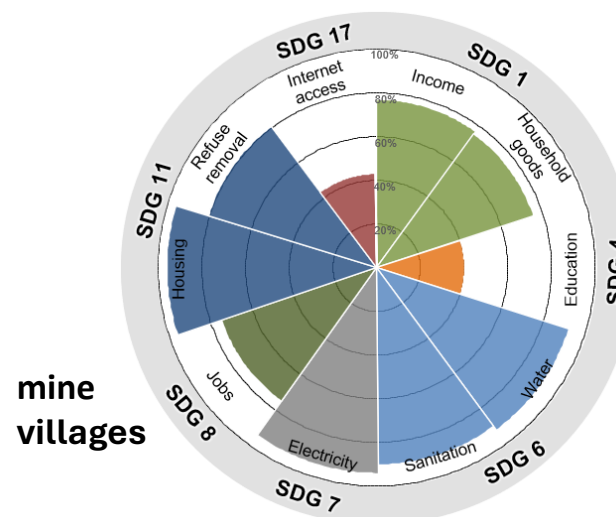
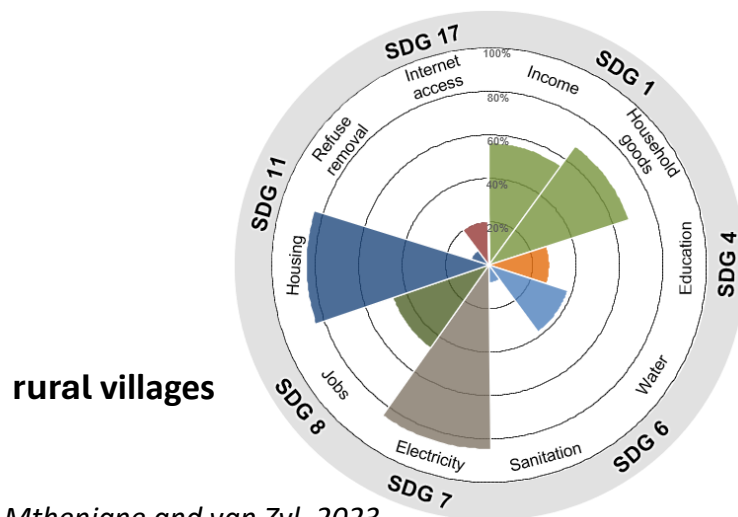
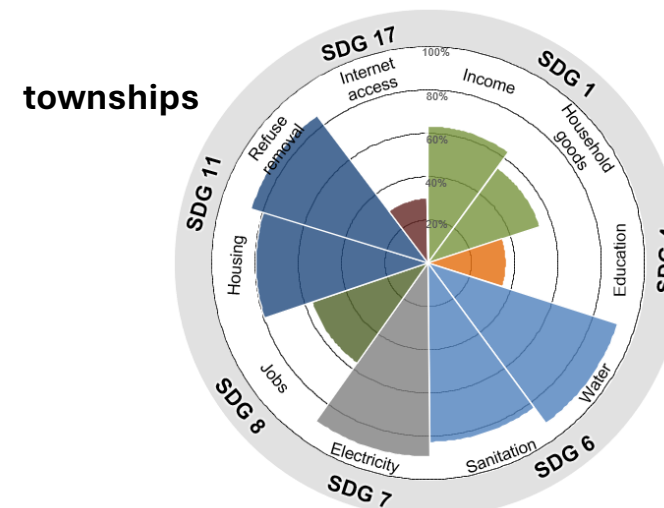
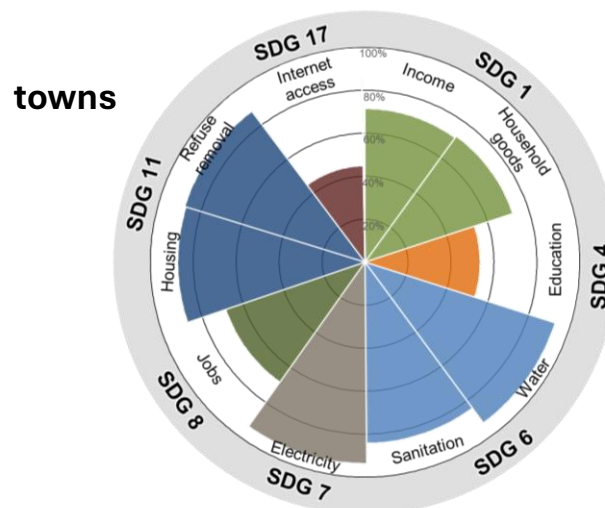
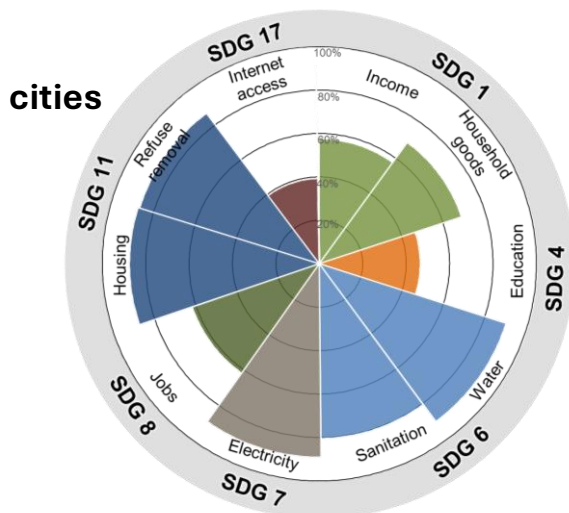
6 CLEAN WATER AND SANITATION

11% of people lack adequate access to piped water

Community type		SDG 1 Poverty		SDG 4 Education	SDG 6 Water and Sanitation		SDG 7 Energy	SDG 8 Work	SDG 11 Cities & communities		SDG 17 Partnerships
		Annual household income >R19,600 (%)	Household fridge ownership (%)	Adult education level NQF4+ (%)	Access to piped water in dwelling or yard (% persons)	Access to toilet (% persons)	Electricity for lighting (% persons)	Employed labour force (%)	Formal housing (% persons)	Refuse removal (% persons)	Household internet access (%)
	Cities	57.6	69.0	46.5	90.3	80.5	89.1	61.8	87.5	94.0	41.3
	Towns	71.5	72.4	53.6	92.9	84.3	93.7	68.5	87.3	87.9	45.3
	Mining towns	70.6	71.8	54.2	94.3	90.3	94.3	75.2	91.1	95.5	53.3
	Townships	63.4	54.5	36.1	92.0	82.9	89.5	56.8	79.7	85.6	30.1
	Mine/plant villages	78.3	70.2	40.3	95.0	93.0	94.2	72.6	96.2	85.7	34.0
	Rural villages	56.4	67.6	27.9	38.1	8.1	84.9	46.7	84.3	8.8	9.8
	TOTAL	62.1	67.8	44.1	88.9	79.4	89.8	61.4	85.2	83.9	39.5

Coal communities – diversity and inequality

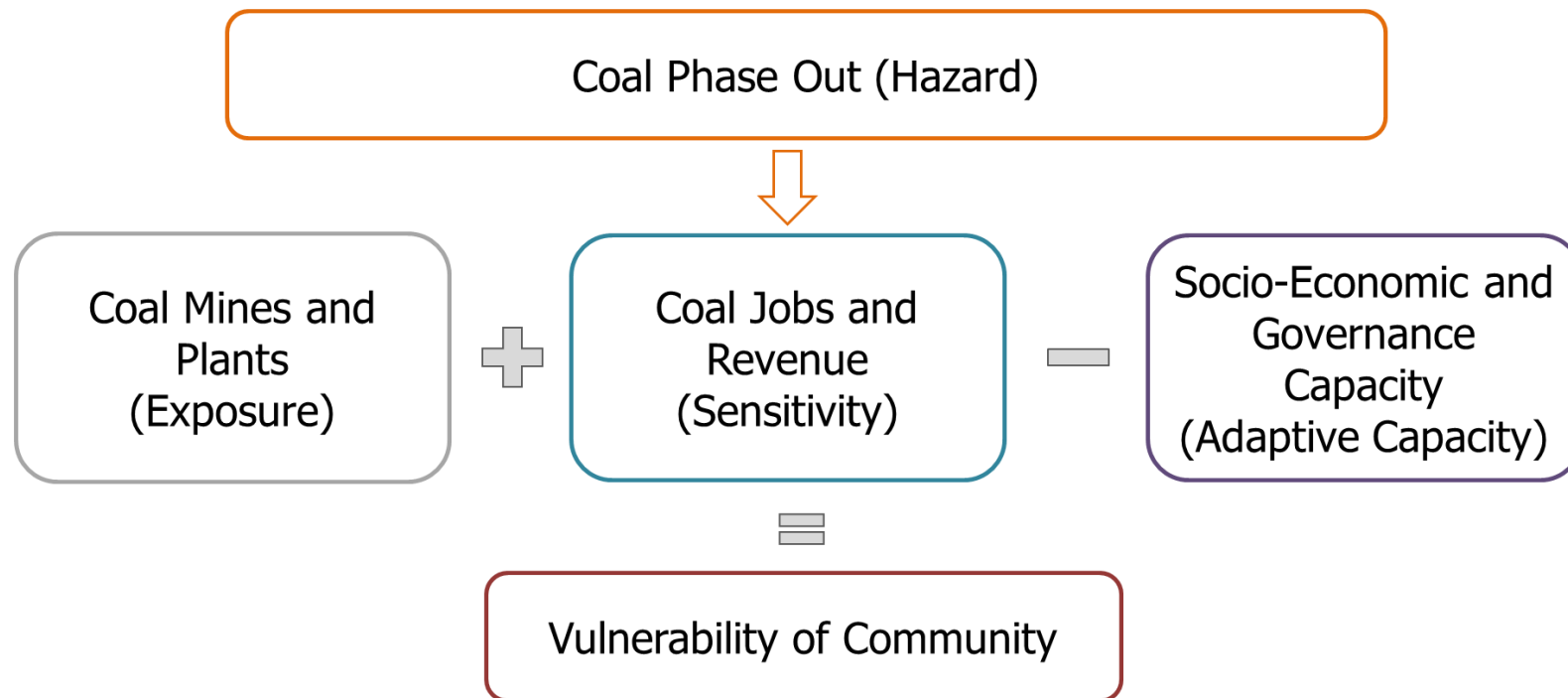
- Widespread low levels of employment, education and internet access hinder just transition
- Level of basic services lowest in female-dominated rural areas and male-dominated informal settlements



Community vulnerability framework for the coal transition

Vulnerability of communities to shocks can differ widely between places and regions and can change over time, and is made up of exposure, sensitivity, and adaptive capacity (IPCC, 2022).

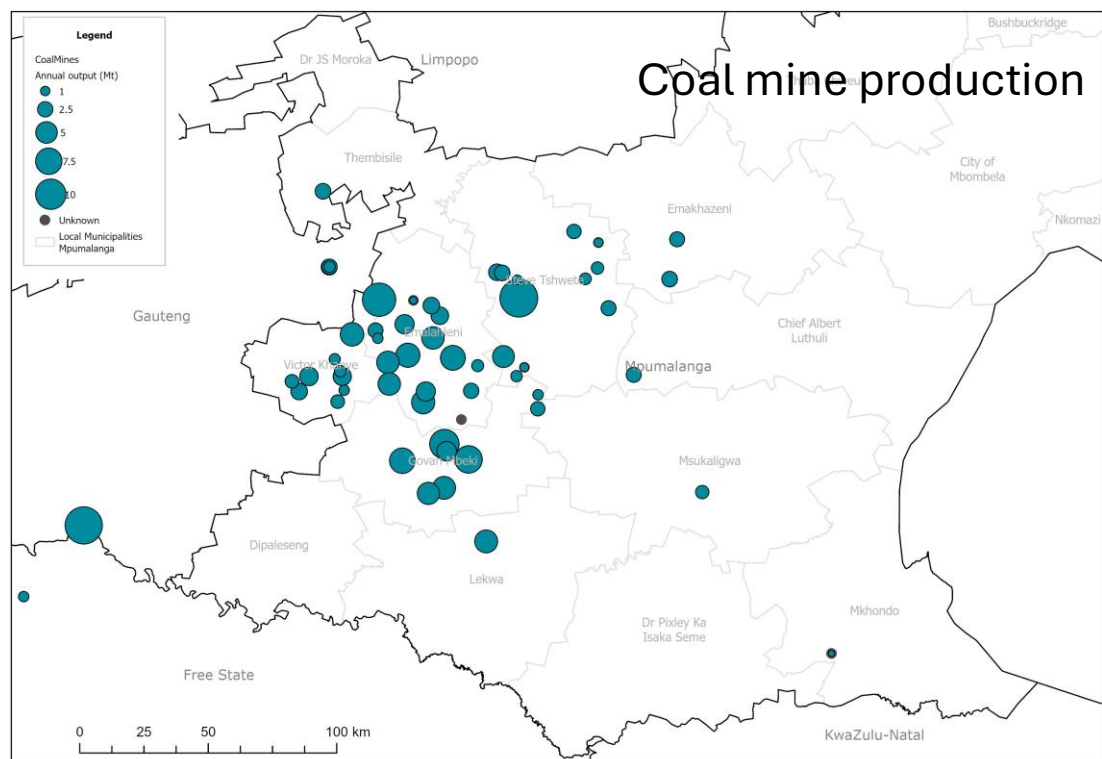
Vulnerability in the context of the just transition is the degree to which a region is susceptible to the transition away from coal (exposure), the extent to which coal phase-down may cause social and economic disruption (sensitivity), and the capacity of the people to effectively adapt or cope.



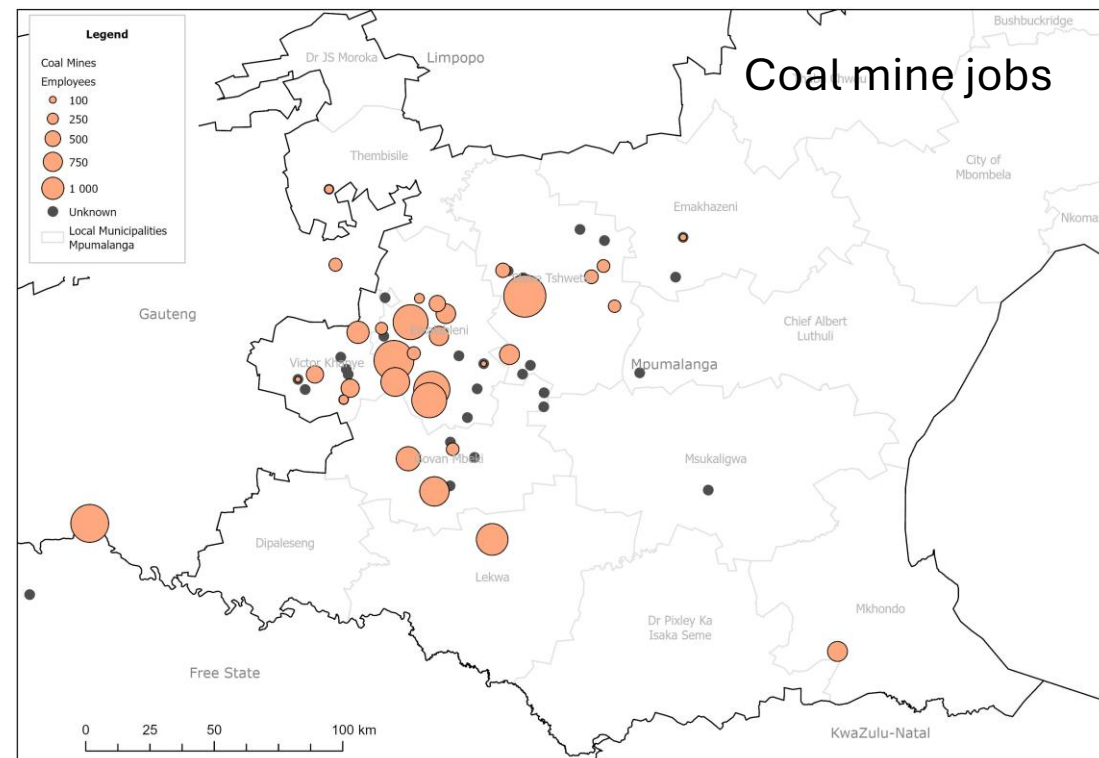
Adapted from Agrawal et al, 2024

Exposure and Sensitivity: Coal production and jobs in Mpumalanga

The range in coal mine production, jobs and revenue, and plant capacity and jobs, affect the exposure and sensitivity of communities to the just energy transition.



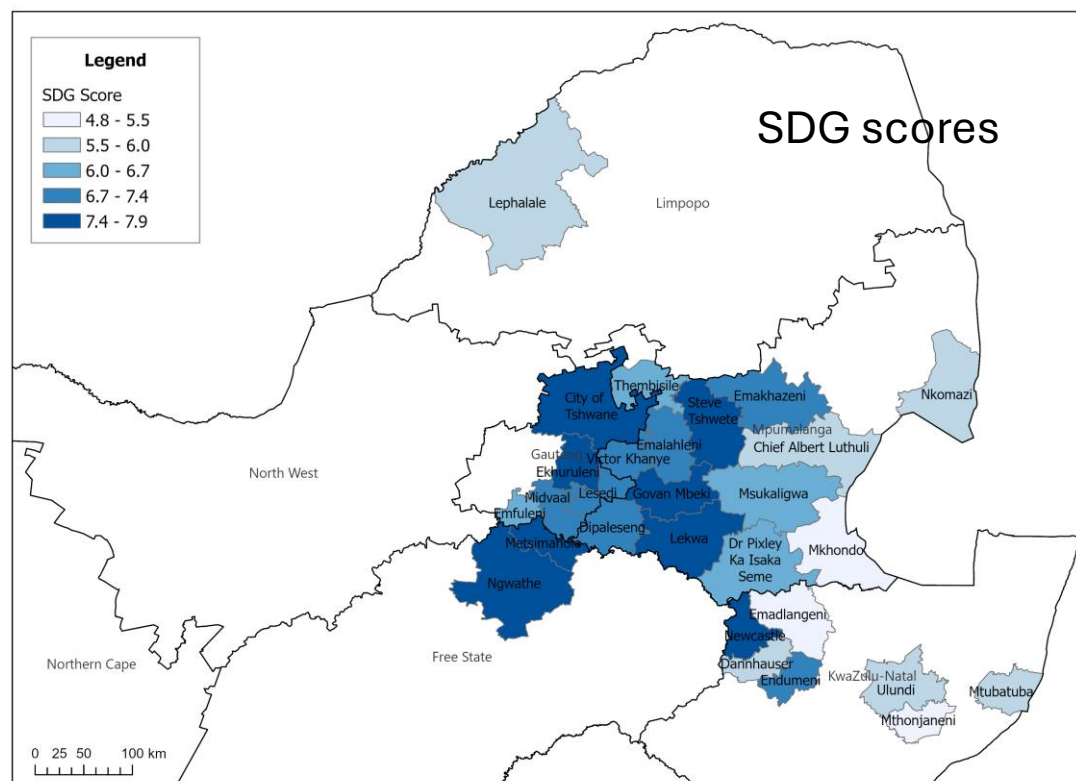
- Range from 0.4 to 15.5 Mtpa
- 35 mining companies but Big 5 produce %



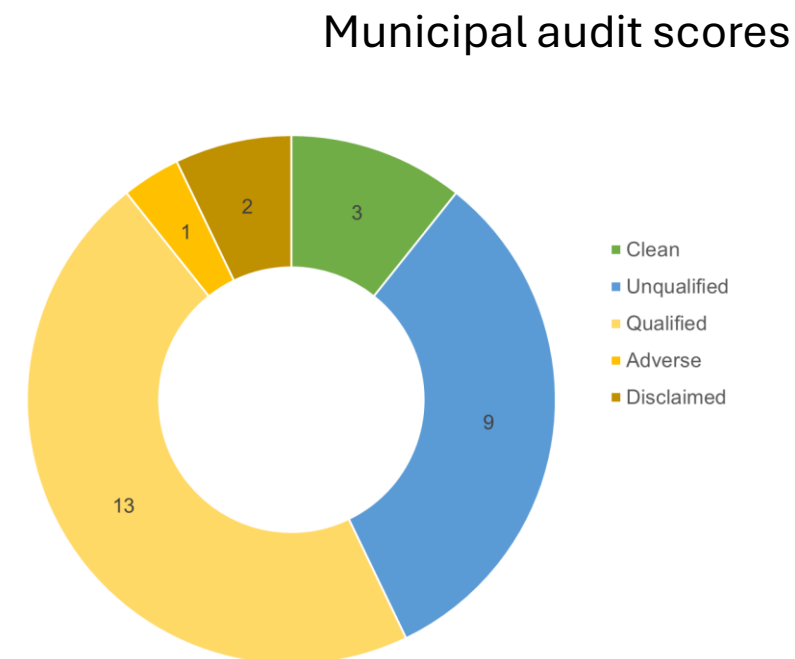
- Range in workforce: 60 – 3,578 employees per mine
- Big 5 companies: >23,900 employees

Adaptive capacity: SDG scores and municipal audits

The range in levels of well-being of communities, local economic diversification, municipal capacity and governance affect the adaptive capacity of community to cope with the just energy transition.

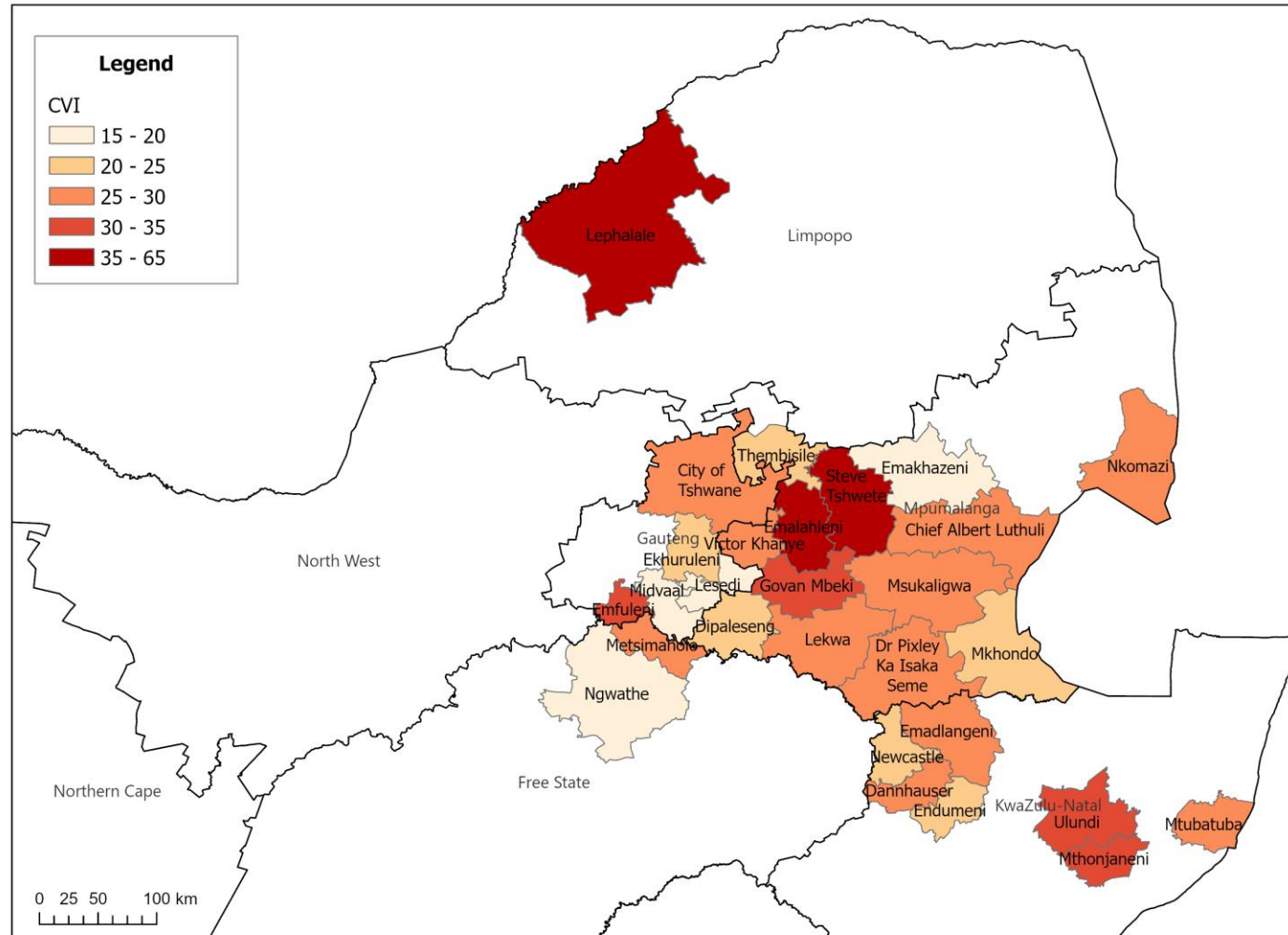


Range in SDG score: 4.8 – 7.9
Combines 10 social indicators



- Range from Clean to Disclaimed
- Most are qualified and unqualified audits

Coal Transition Vulnerability Index for South Africa



- Highest vulnerability to the coal phase down in eMalahleni (66) and Steve Tshwete (41) local municipality where the most mines and plants are
- Central KwaZulu-Natal also vulnerable due to very low adaptive capacity
- Lowest vulnerability where there is only one mine or plant, and higher adaptive capacity

Concluding remarks



Coal mine closures are inevitable, regardless of climate change commitments, due to resource depletion.



Coal workers and their communities are at risk of job losses, income losses, local economic shocks, and loss of services and investment.



The capacity of the affected coal communities to adapt depends on their socio-economic baseline and local context, which varies significantly.



Mine closure planning is essential to minimise environmental and socio-economic risks, and district and local governments have an important role to play in ensuring the transition is just.



The just transition narrative helps focus in on people and communities but needs greater focus at the local level.

Thank you

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