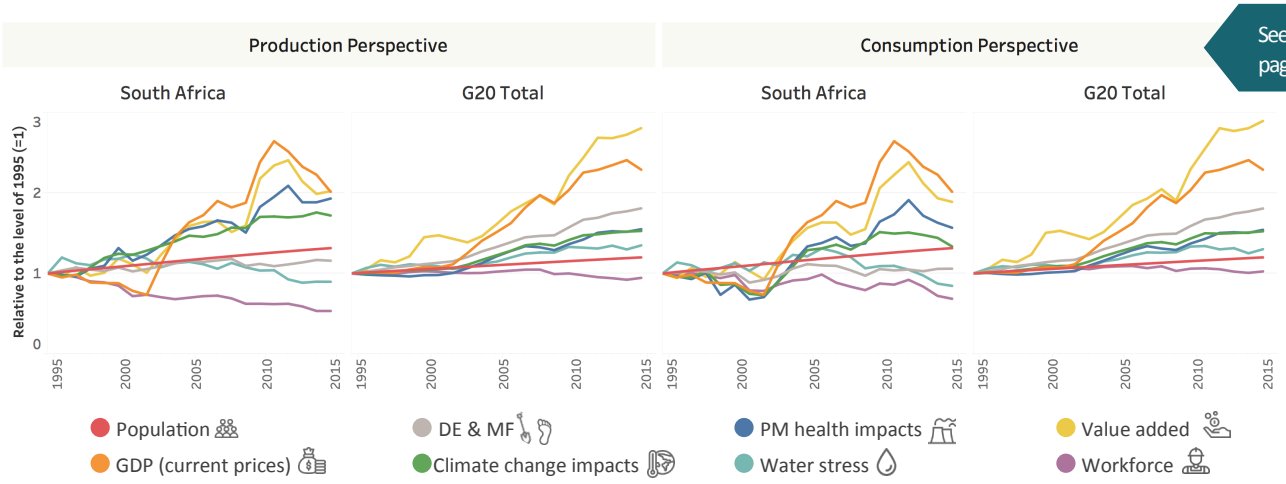
Natural Resource Use in the Group of 20

Status, Trends, and Solutions | South Africa

Status and Trends of Natural Resource Use

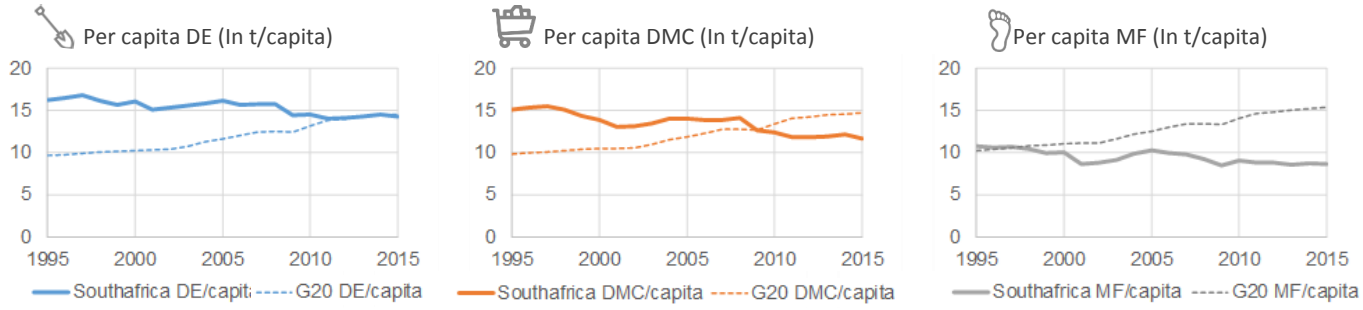
Figure 1: Socio-economic indicators, domestic extraction, material footprint, and material-related environmental impacts in South Africa and in the G20 (1995-2015)*



See glossary on pages 2 and 3

*Data after 2011 was nowcasted.
Source: IRP database, Exiobase v3.4 and Cabernard et al. 2019

Figure 2: Domestic extraction, domestic material consumption, and material footprint per capita in South Africa and in the G20 (1995-2015)



Source: IRP database

From 1995 to 2015

Population grew by **32%** and GDP **doubled** (with high fluctuations in-between).

Per-capita domestic extraction, domestic material consumption and material footprint slightly decreased. Domestic material consumption and material footprint fell below G20 average.

In 2015, domestic extraction was **15** tonnes per capita while material footprint was **9** tonnes per capita. This is due to South Africa's status as a resource exporting nation.

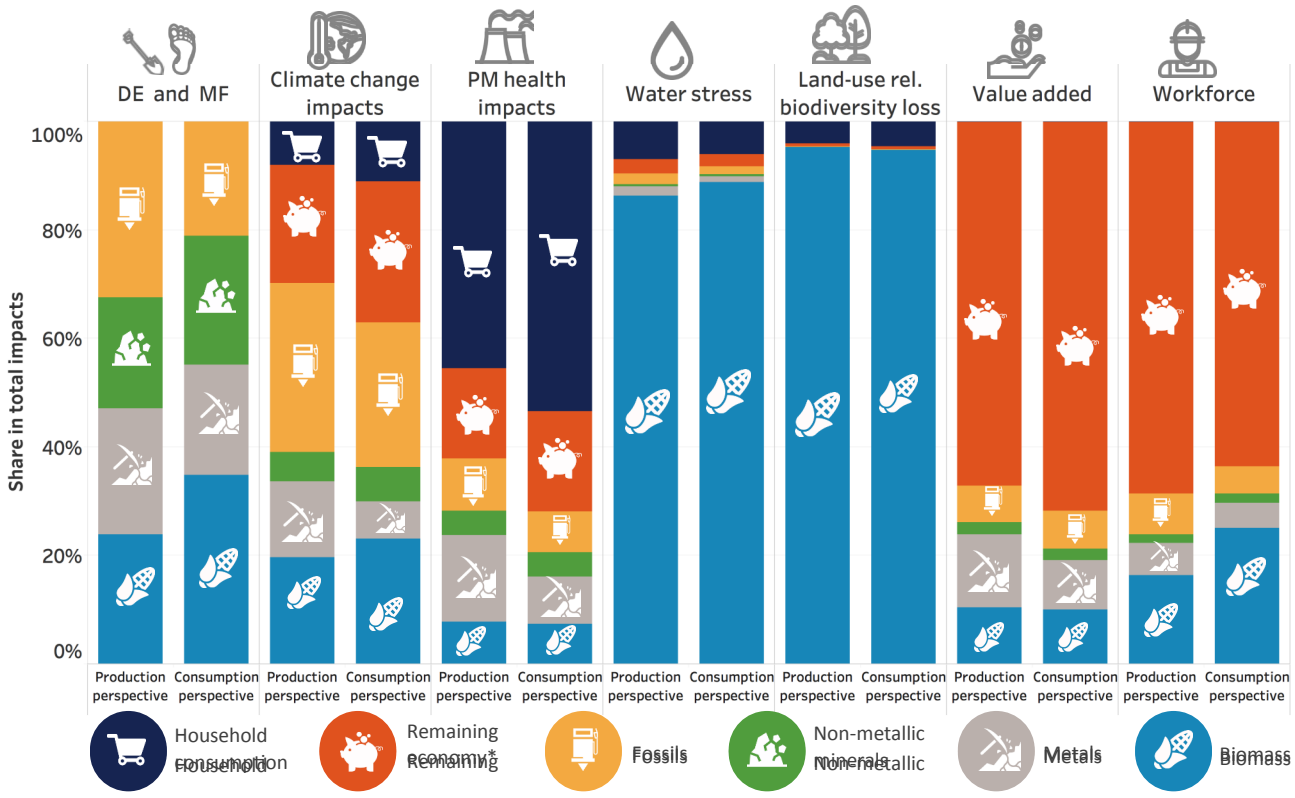
Material related environmental impacts decoupled from GDP.

From a production perspective, climate change impacts related to material extraction and processing increased and were about **50%** higher than the G20 average.

From a consumption perspective, climate change impacts related to material extraction and processing were similar to the G20 average.

Contribution of Natural Resources by Category

Figure 3: Contribution of resource types to domestic extraction, material footprint, and total environmental and socio-economic impacts in South Africa (2015)



*Remaining economy refers to activities other than resource extraction and processing (e.g. manufacturing of finished products, construction).
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

Unlike the G20 average, fossils dominated domestic extraction amounts, followed by biomass and metals. Most of the material footprint was caused by biomass.

The extraction and processing of natural resources accounted for almost 70% of South Africa's total climate change impacts from a production perspective and 60% from a consumption perspective (the G20 average was approximately 50% from both perspectives).

Outdoor particulate matter related health impacts mainly came from households (use of solid fuels for cooking).

In line with other G20 countries, South Africa's water stress and land use-related biodiversity impacts were caused mainly by biomass production.

The material sector contributed more than 30% to value added from a production perspective and about 25% from a consumption perspective. This is higher than the G20 average (less than 20%).

Glossary

Consumption perspective: The consumption perspective allocates the use of natural resources or the related impacts throughout the supply chain to the region where these resources, incorporated in various commodities, are finally consumed by industries, governments and households

Decoupling: Decoupling is when resource use or some environmental pressure either grows at a slower rate than the economic activity that is causing it (relative decoupling) or declines while the economic activity continues to grow (absolute decoupling)

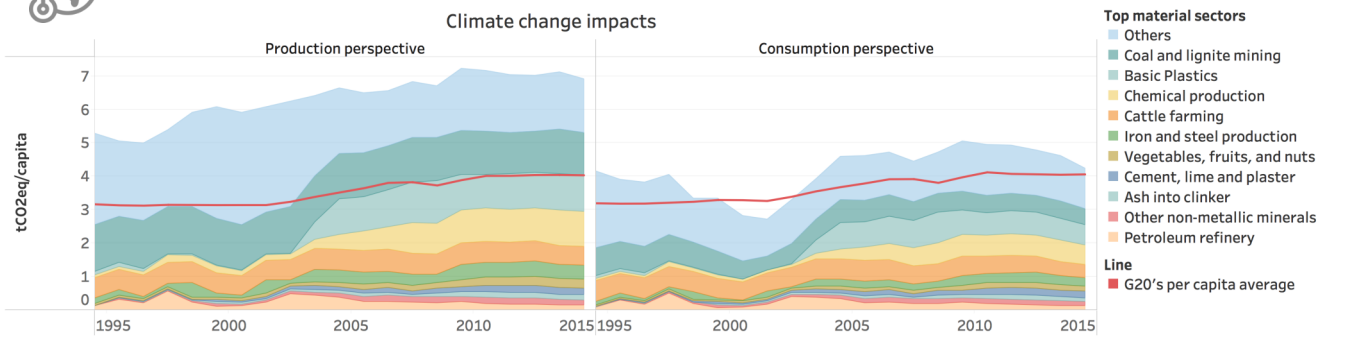
Domestic extraction (DE): Direct, gross physical extraction of materials within a country's territory (production perspective)

Domestic material consumption (DMC): Amount of materials directly used by an economy (DMC = DE + Material Imports – Material Exports)

Material resources:
- metals,
- non-metallic minerals,
- biomass,
- fossils

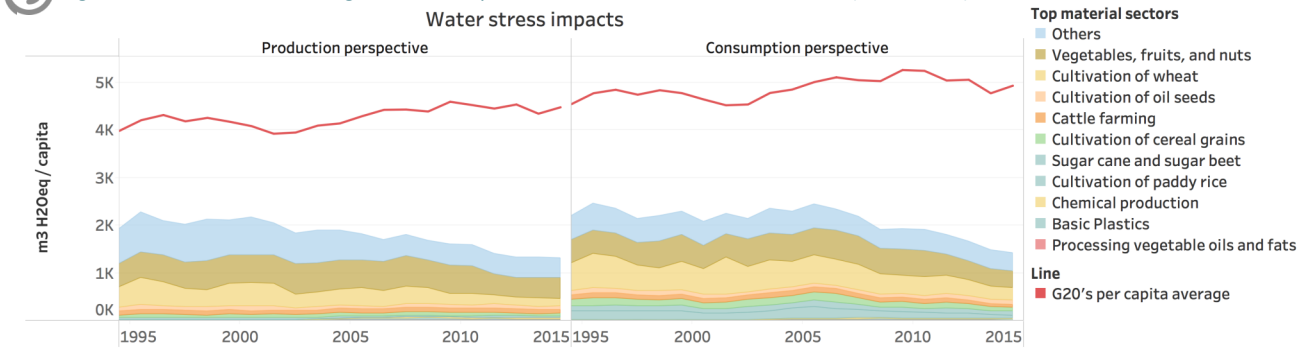
Key Sectors and Resources

Figure 4: Climate change impacts from material sectors in South Africa (1995-2015)*



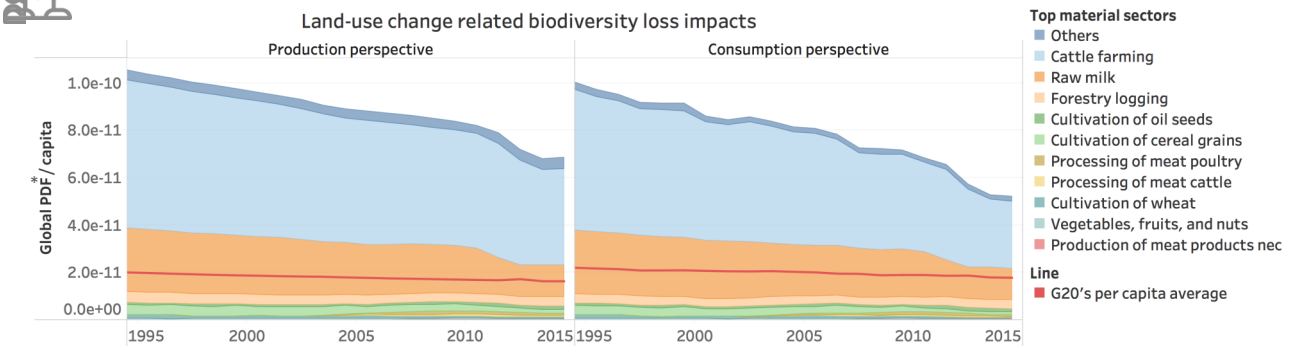
*Data after 2011 was nowcasted.
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

Figure 5: Water stress from agricultural crop and material sectors in South Africa (1995-2015)*



*Data after 2011 was nowcasted.
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

Figure 6: Land-use related biodiversity loss from agricultural crops and material sectors in South Africa (1995-2015)*



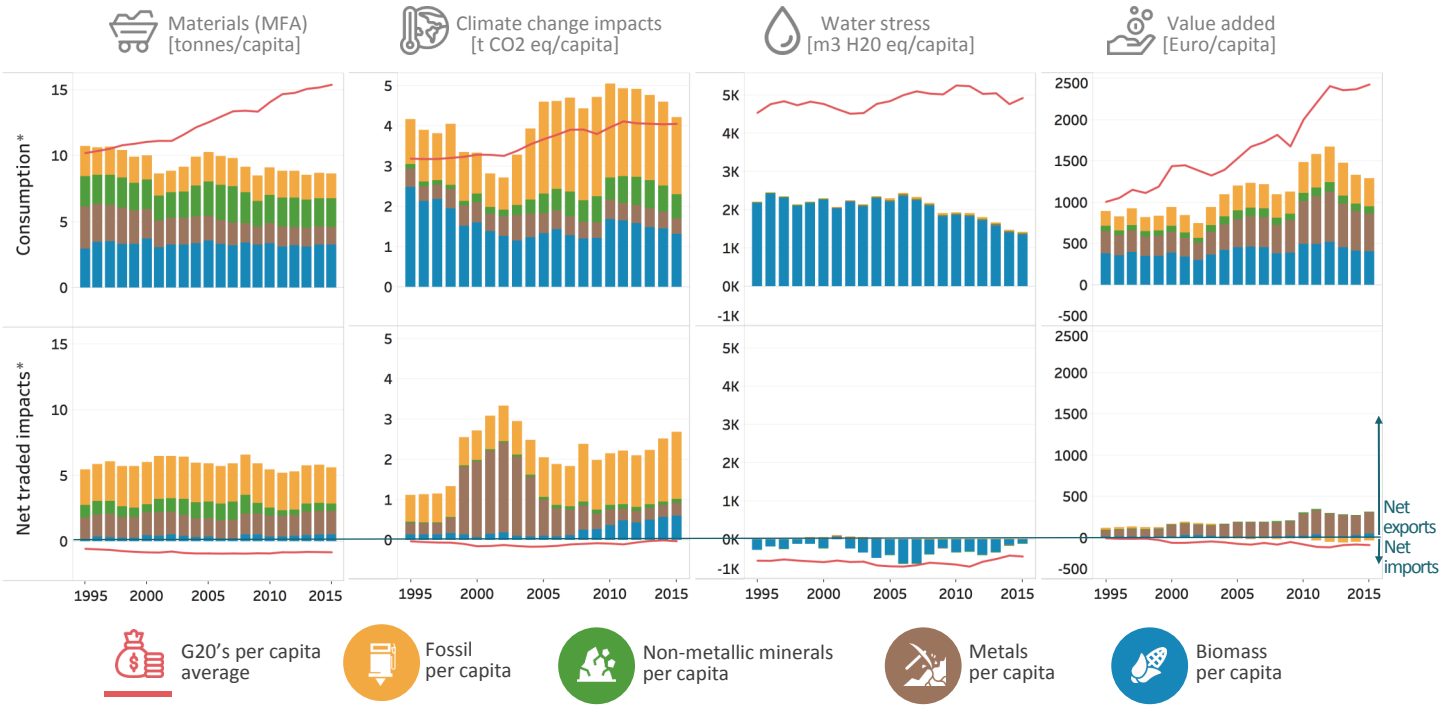
*Data after 2011 was nowcasted.
*PDF: Potentially disappeared fraction of species
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

- Material-related climate change impacts were mainly caused by coal mining, plastics manufacturing, production of chemicals, and cattle farming.
- Material related climate change impacts remained more than 50% higher than the G20 average from a production perspective.
- From a consumption perspective, material related climate change impacts were similar to the G20 average. This is due to emissions caused by the extraction and processing of materials that are exported.
- South Africa has many water-scarce regions, but overall water stress impacts are lower than the G20 average and declined over time.
- Water stress was dominated by the production of vegetables, fruits, nuts, and wheat.
- Land use related biodiversity loss was much higher than the G20 average, caused mostly by beef and dairy production.

- **Material footprint (MF):** A nation's MF fully accounts for material extraction in other countries used for local consumption in the nation of interest (consumption perspective)
- **Material intensity (MI):** Indicates efficiency of material use (MI = DMC / GDP)
- **Material-related impacts:** Impacts related to the extraction and processing of material resources (including the upstream supply chain, such as electricity generation and transport)
- **Net traded materials/impacts:** Difference between material-related impacts from a production and consumption perspective. In the case of environmental impacts, a positive value means that the material-related impacts from exports are greater than the impacts from imports (and vice-versa: environmental impacts with negative values mean that the material-related impacts from imports are greater than the impacts from exports)
- **Production perspective:** The production perspective allocates the use of natural resources or the impacts related to natural resource extraction and processing to the location where they physically occur

The environmental effects of trade

Figure 7: Per-capita consumption footprints (above) and net traded impacts (below) in South Africa (1995-2015)*



*Data after 2011 was nowcasted.
Consumption: Impacts throughout the supply chain from goods imported and consumed in South Africa.
Net traded impacts: Difference between material-related impacts from a production and consumption perspective.
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

South Africa is a net exporter of all material types.

More climate change impacts were caused by material exports than by material imports.

More water stress was caused from imports than exports, due to imports of biomass from water-scarce countries.

For all material types but fossils, material trade created net value added within South Africa. For fossils, cheap resources were exported (e.g. coal) while more expensive ones were imported.

Future trends and potential Decoupling

South Africa suffers from particulate matter pollution caused by resource use. Lowering solid fuel burning in households and improving fuels are essential steps to decrease pollution.

The electricity mix relies heavily on coal. More renewables could decrease the environmental impacts of material processing.

A large build-up of infrastructure is anticipated in the next decades. This will result in enhanced resource demands and environmental impacts. Material efficient urban design is therefore critical.

This factsheet from the International Resource Panel, was prepared in cooperation with the Ministry of Environment of Japan and the Institute for Global Environmental Strategies, as a contribution to the G20 Resource Efficiency Dialogue 2019 in Japan. The document is based on research completed by the IRP for the report "Global Resources Outlook 2019: Natural Resources for the Future We Want." The data analysis and text for the G20 was prepared by Livia Cabernard, Stephan Pfister Stefanie Hellweg (ETH Zurich), and Maria Jose Baptista (UNEP) with inputs from Victor Valido (UNEP), Yingying Lu and Heinz Schandl (CSIRO). The layout and infographics were designed by Yi-Ann Chen with support from Qinhan Zhu on figure layout. Icons used are from Freepik.

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