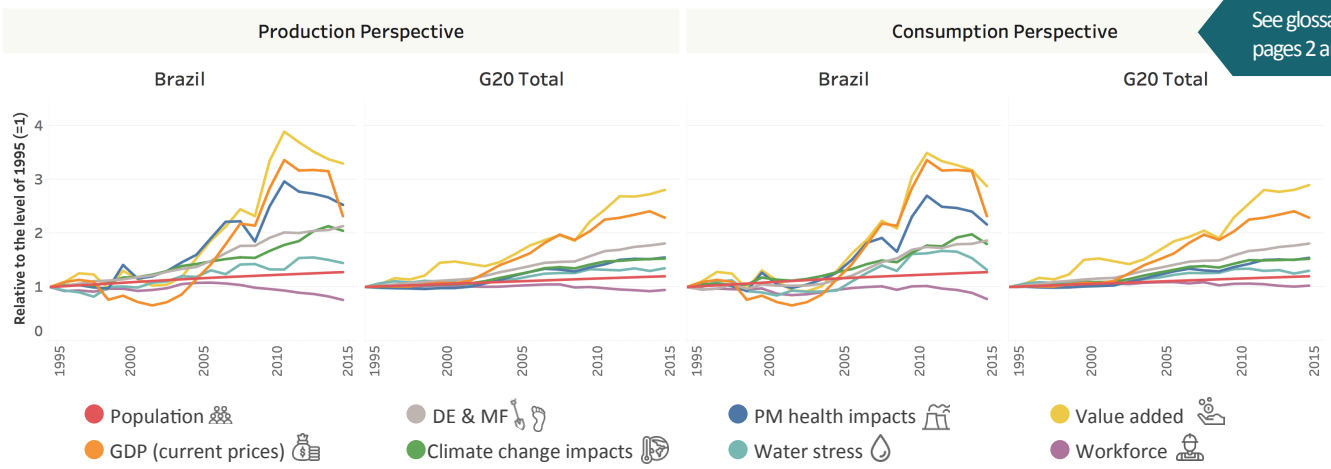
Natural Resource Use in the Group of 20

Status, Trends, and Solutions | Brazil

Status and Trends of Natural Resource Use

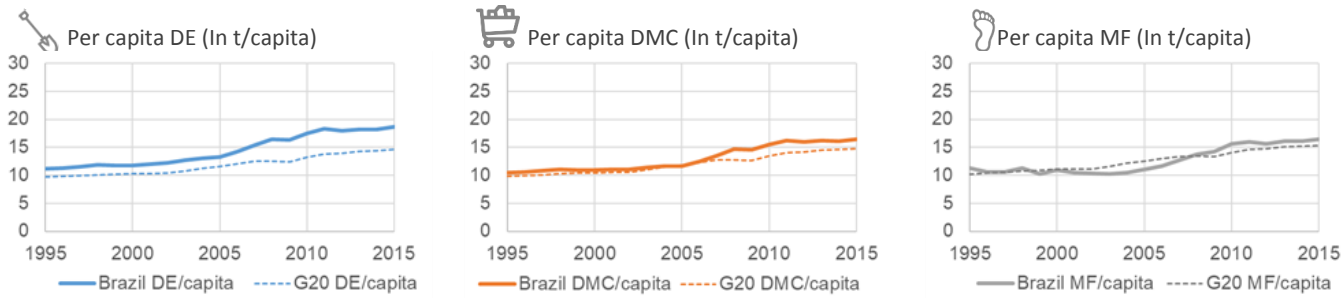
Figure 1: Socio-economic indicators, domestic extraction, material footprint, and material-related environmental impacts in Brazil and in the G20 (1995-2015)*



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 Brazil and in the G20 (1995-2015)



Source: IRP database

From 1995 to 2015

Population grew by **28%** and GDP more than doubled (with recessions at the beginning and end of the period).

Domestic extraction, domestic material consumption and material footprint slightly increased, similar to the G20 average.

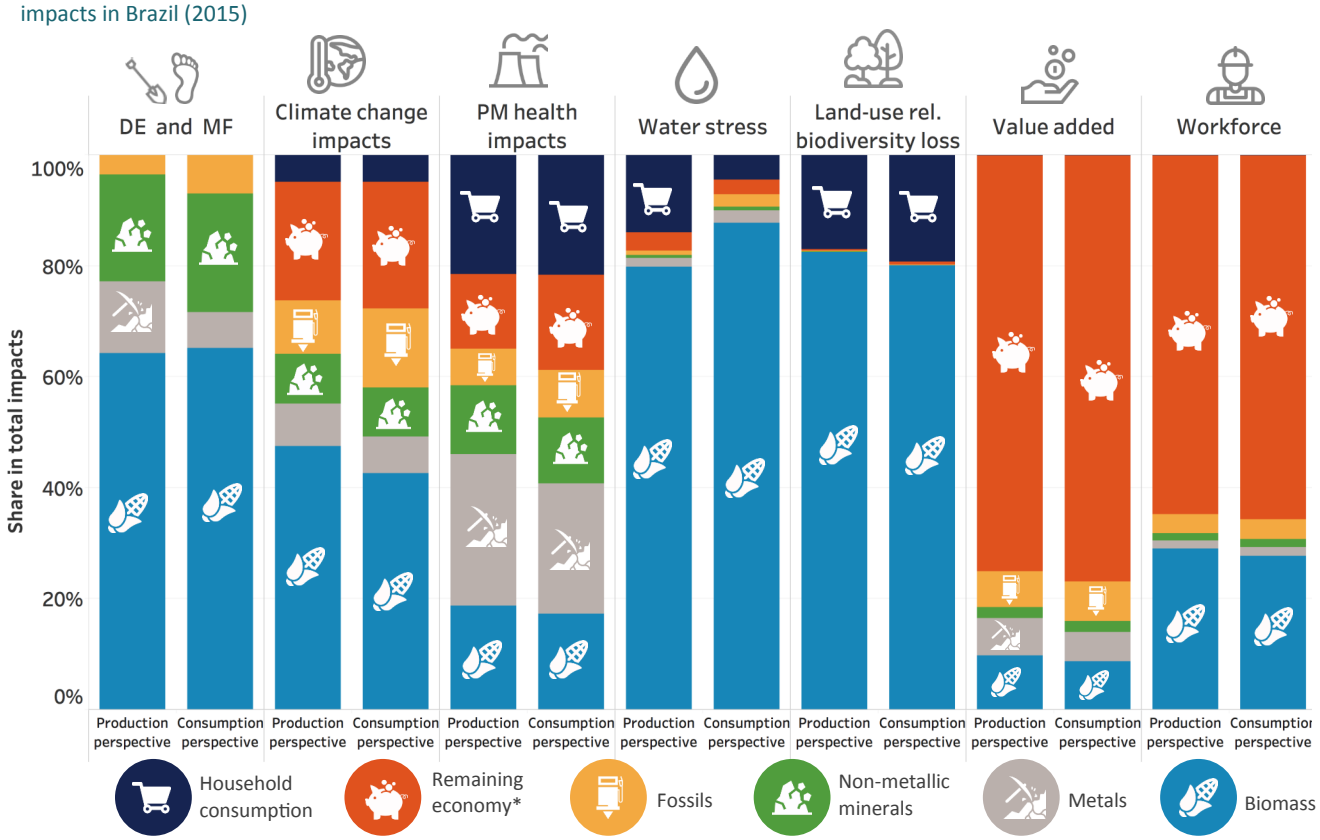
By 2015, domestic extraction reached 19 tonnes per capita, while domestic material consumption and material footprint each reached 16 tonnes per capita (G20 average was 15 tonnes per capita for all three indicators).

Material-related environmental impacts decoupled relatively from GDP, except for particulate matter related health effects.

From both a production and consumption perspective, climate change impacts related to material extraction and processing increased and were slightly higher than 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 Brazil (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 G20 average, biomass production dominated domestic extraction amounts and material footprint, followed by non-metallic minerals.

From a production and consumption perspective, the extraction and processing of natural resources accounted for more than 70% of Brazil's total climate change impacts (the G20 average is approximately 50% from both perspectives). More than 40% of these impacts come from the biomass sector (the G20 average is less than 20%).

Outdoor particulate matter related health impacts were mainly caused by the extraction and processing of natural resources (more than 60% from the production and consumption perspectives).

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

From a production and consumption perspective, the material sector contributed to around 20% of value added, which is similar to the G20 average.

One third of the workforce is employed in material related sectors (mainly biomass production).

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)

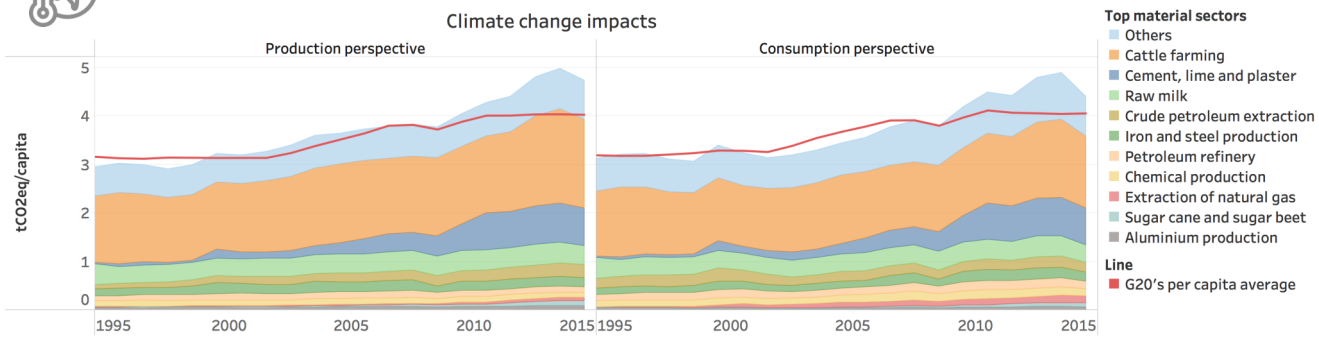
Domestic extraction (DE): Direct, gross physical extraction of materials within a country's territory (production perspective)

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

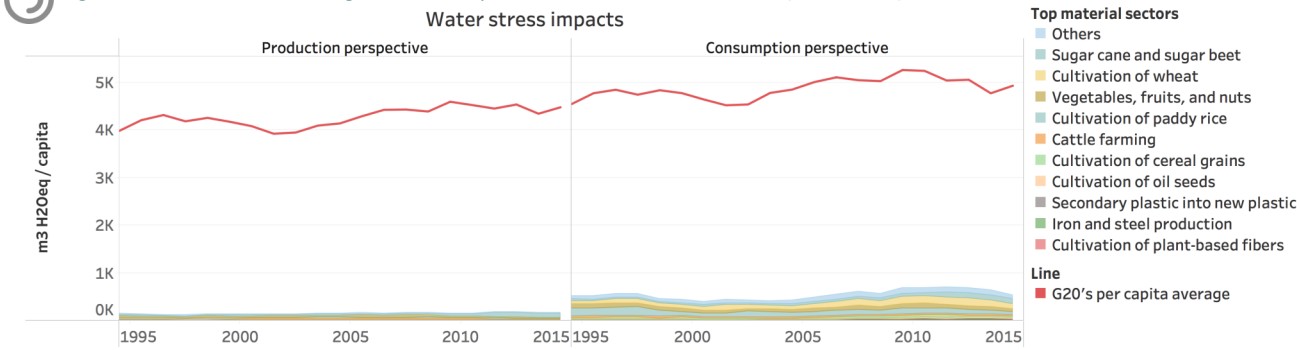
Key Sectors and Resources

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



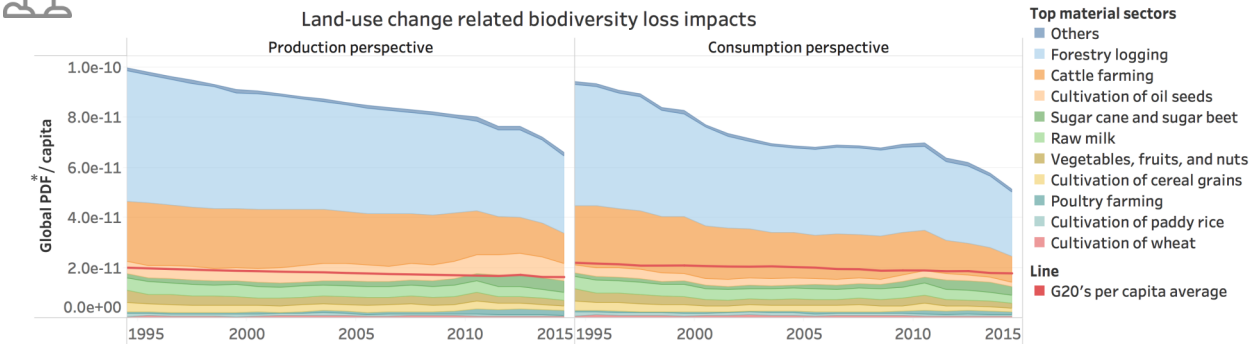
*Data after 2011 was nowcasted. Climate change impacts from deforestation were not included.
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

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



*Data after 2011 was nowcasted. Only biodiversity impacts of deforestation registered as land used for cropland or pasture were accounted for.
*PDF: Potentially disappeared fraction of species
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

- From a production and consumption perspective, material-related climate change impacts were mainly caused by cattle farming, followed by cement, milk production, petroleum extraction, and steel production. Climate change impacts from land use change (e.g. deforestation) were not included in this analysis.
- Material-related climate change impacts were higher than the G20 average, by about 20% from a production perspective and 10% from a consumption perspective. This difference is due to emissions from cattle farming (i.e. beef exports).
- Most materials with large climate impacts (beef, dairy and petroleum products) are directly consumed by households.
- The construction sector is the major industrial end-user of climate-intensive materials (18% of total material-related impacts).
- While Brazil has abundant water resources, some regions suffer from water scarcity. Compared to the G20 average, water stress impacts in Brazil are negligible (from both perspectives).
- From a production perspective, land-use related biodiversity loss was almost four times higher than the G20 average.
- From a consumption perspective, land-use related biodiversity loss was three times higher than the G20 average. Forestry, contributed to almost half of these impacts, followed by beef, oil seeds and sugar production. Note that land use change impacts (deforestation) were assessed here only when there was a new registered use for the deforested area (e.g. cropland). As a consequence, biodiversity loss in Fig. 6 is underestimated.

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)

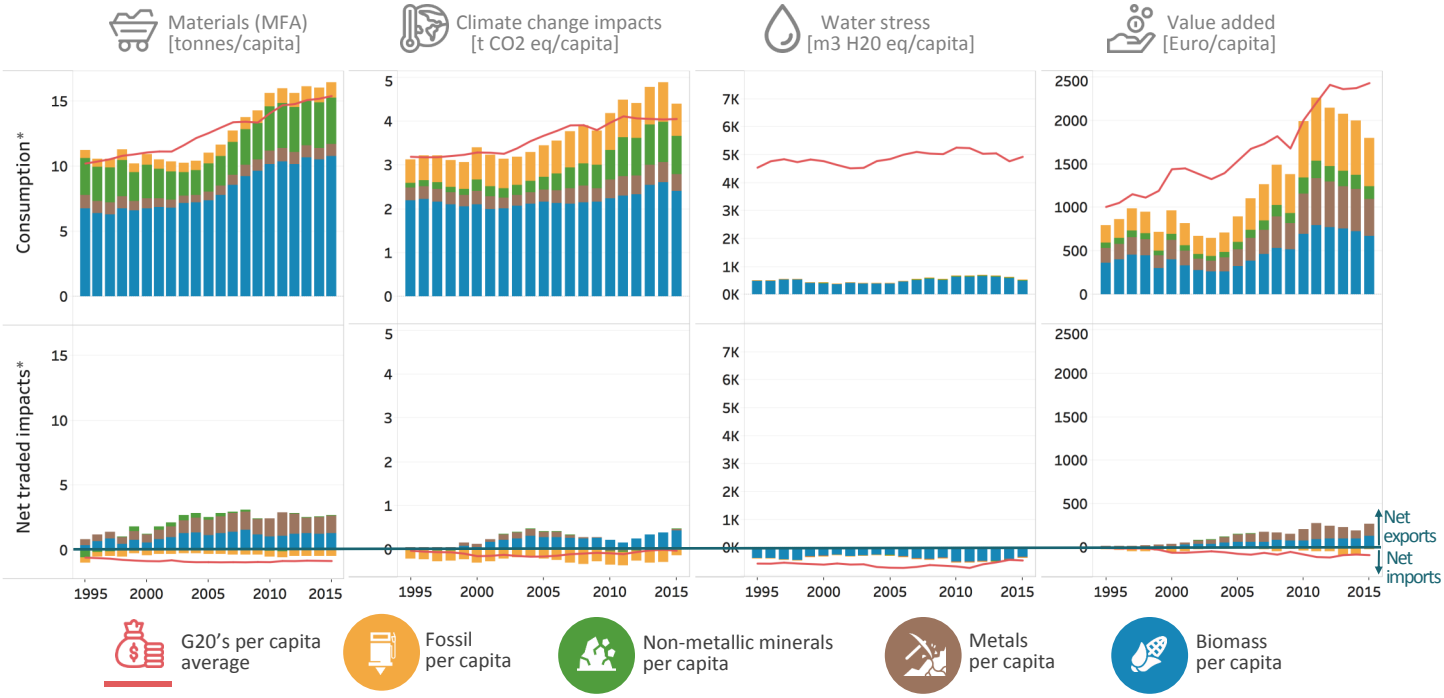
Material-related impacts: Impacts related to the extraction and processing of material resources (including the upstream supply chain, such as electricity generation and transport)

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 Brazil (1995-2015)*



*Data after 2011 was nowcasted.
Consumption: Impacts throughout the supply chain from goods imported and consumed in Brazil.
Net traded impacts: Difference between material-related impacts from a production and consumption perspective.
Source: IRP database, Exiobase 3.4, Cabernard et al. 2019

- Brazil is a net exporter of all material types, except for fossils. Net traded amounts of materials were low compared to consumption, except for metals.
- More climate change impacts are caused by material exports than by material imports, except for fossils. Biomass is the main source of net impacts.
- More water stress is caused by 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 Brazil.

Future trends and potential Decoupling

- Scenarios developed by the IRP forecast an increase of GDP by a factor between 2.7 and 3.7 and a population growth of between 3% and 13% until 2060.
- If ambitious resource efficiency policies are introduced, Brazil could achieve a relative decoupling of domestic material extraction and domestic material consumption from GDP until 2060.
- Overall, domestic extraction and domestic material consumption are projected to increase by about 40% and 30%, respectively, in the resource efficiency scenario.
- Brazil suffers from particulate matter pollution from resource extraction and processing, especially related to metal exports (mainly iron and steel). Improving emission control in material sectors is important.
- A large build-up of infrastructure is anticipated in the next decades. This could result in enhanced resource demands and environmental impacts from steel and cement production. Material efficient urban design is therefore crucial.
- Forest protection policies in Brazil significantly slowed down deforestation of the Amazon rainforest in the last 10 years but rates have started to rise again. Improved management and protection of this unique ecosystem is critical to lower environmental impacts

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.

International Resource Panel

UN environment programme