

NATURAL RESOURCE USE IN THE GROUP OF 20

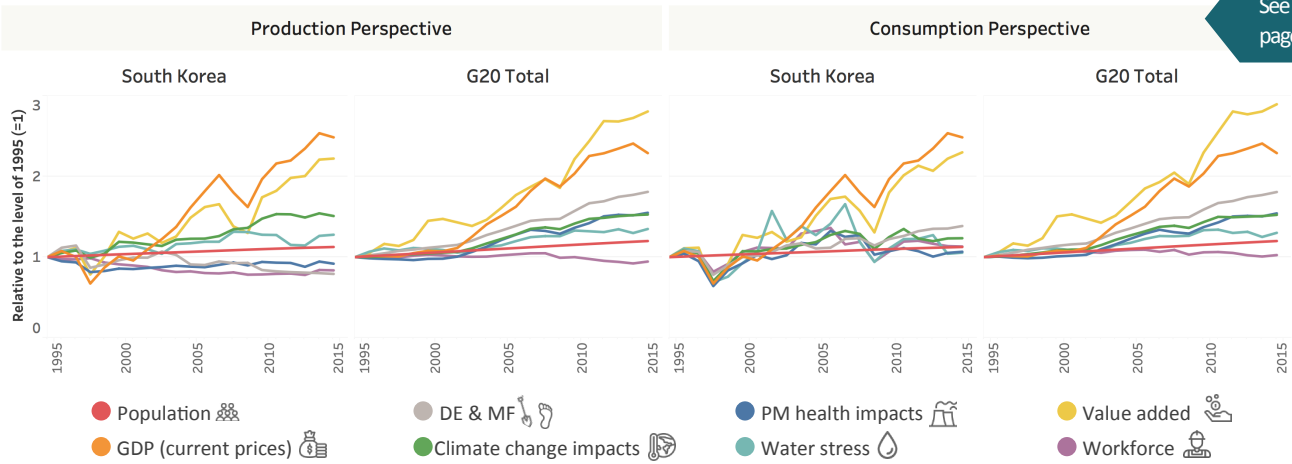
Status, Trends, and Solutions

South Korea

STATUS AND TRENDS OF NATURAL RESOURCE USE

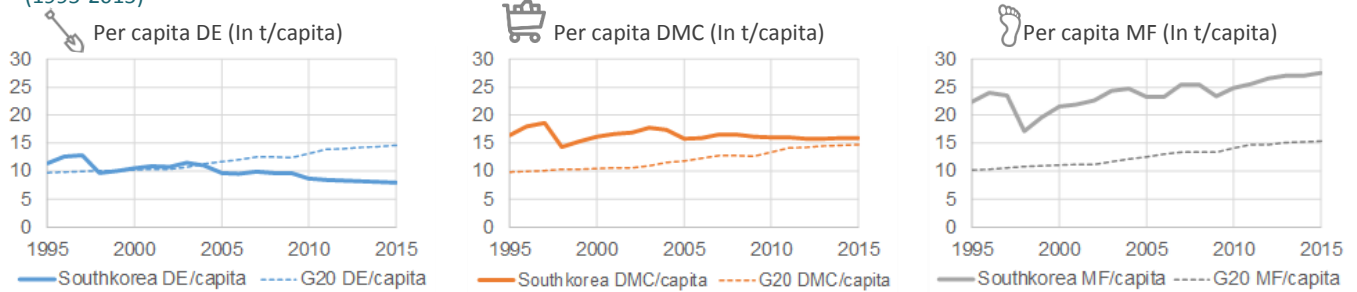
Figure 1: Socio-economic indicators, domestic extraction, material footprint, and material-related environmental impacts in South Korea and in the G20 (1995-2015)*

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 Korea and in the G20 (1995-2015)

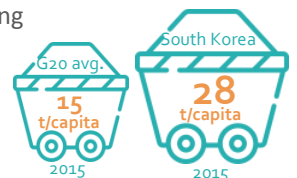


Source: IRP database

From 1995 to 2015

While population increased by **13%**, the economy underwent a recession in the beginning of this period and recovered afterwards. GDP was 2.5 times higher in 2015 than in 1995.

Material footprint increased to **28** tonnes per capita (G20 average was 15 tonnes per capita in 2015).



This increase occurred in the supply chain of imported products, while domestic extraction of materials decreased to **8** tonnes per capita.

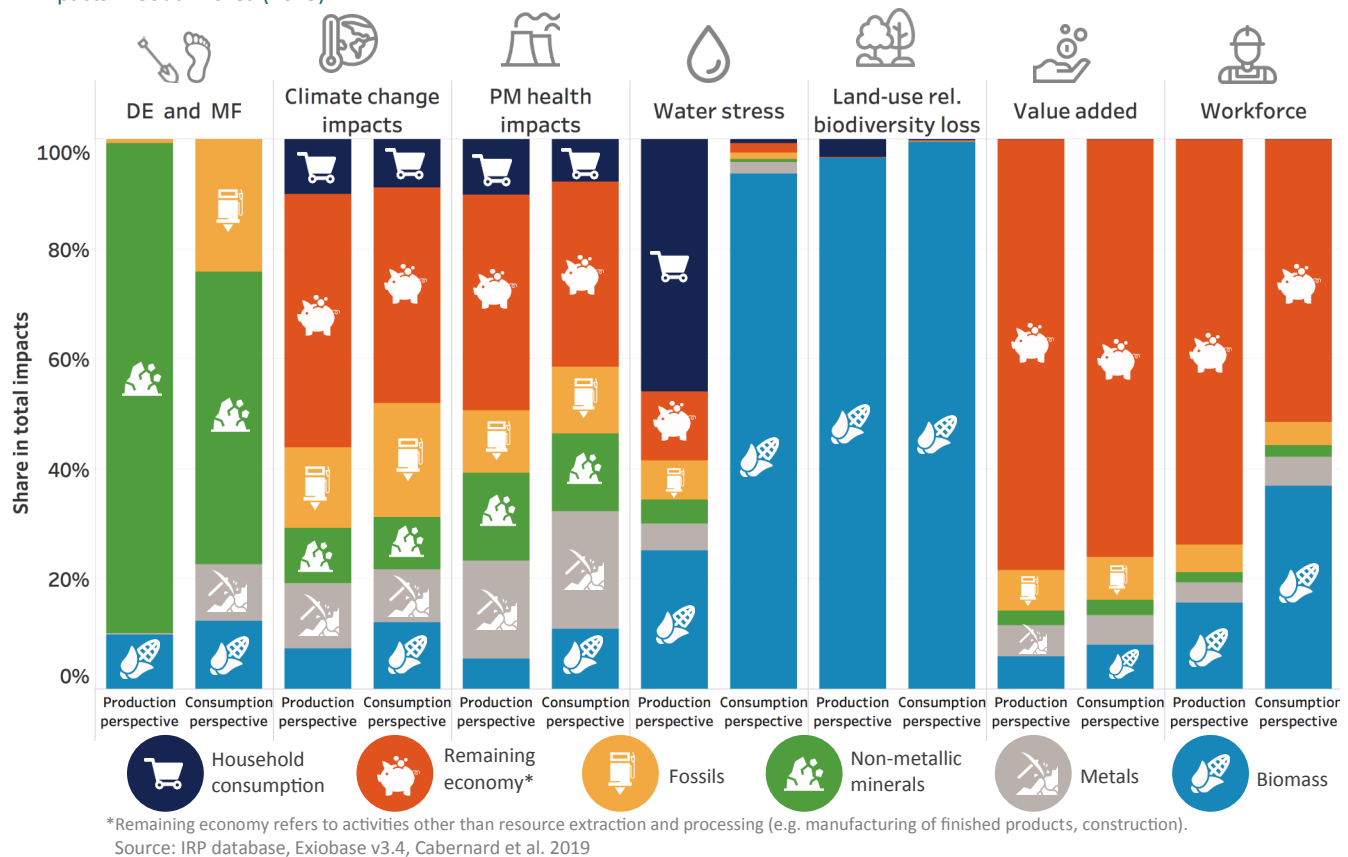
South Korea experienced a relative decoupling of domestic extraction, material footprint and material-related environmental impacts from GDP from a consumption perspective.



Per-capita climate change impacts related to material extraction and processing slightly increased, and the absolute level of material-related climate change impacts remained high (**80%** higher than G20 average from a consumption perspective).

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 Korea (2015)



- Non-metallic minerals like sand and gravel dominated the domestic extraction amounts, but contributed less to the material footprint and only caused a minor share of environmental impacts.
- From a production perspective, the extraction and processing of natural resources accounted for more than 40% of total climate change impacts. From a consumption perspective, these accounted for more than 50% of total climate change impacts. The G20 average from both perspectives was approximately 50%.
- Levels of water stress and land use-related biodiversity loss were low within the country. From a consumption perspective, biomass resources dominated these impacts.
- About 50% of outdoor particulate matter related health impacts were caused by material production. Most of these emissions came from energy inputs (from cement production, iron and steel manufacturing and coal electricity used for material processing).
- Both from a production and consumption perspective, more than 20% of economic value added was created through the extraction and processing of resources. This is comparable to the G20 average.
- Materials production contributed to less than 30% of domestic jobs. South Korea relied on low-income workforce in agriculture abroad for food imports.
- For all indicators, the share related to material extraction and processing is higher from a consumption perspective than from a production perspective.

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)

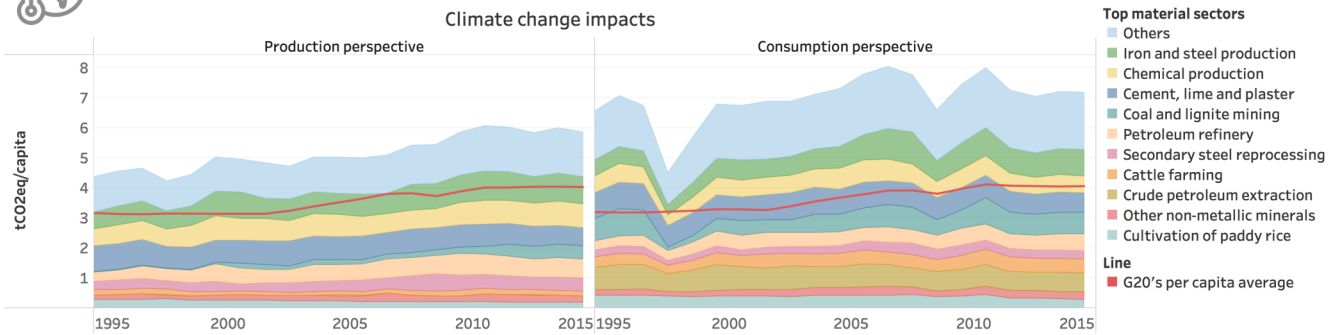
Domestic material consumption (DMC): Amount of materials directly used by an economy (DMC = DE + Material Imports – Material Exports)

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

KEY SECTORS AND RESOURCES



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

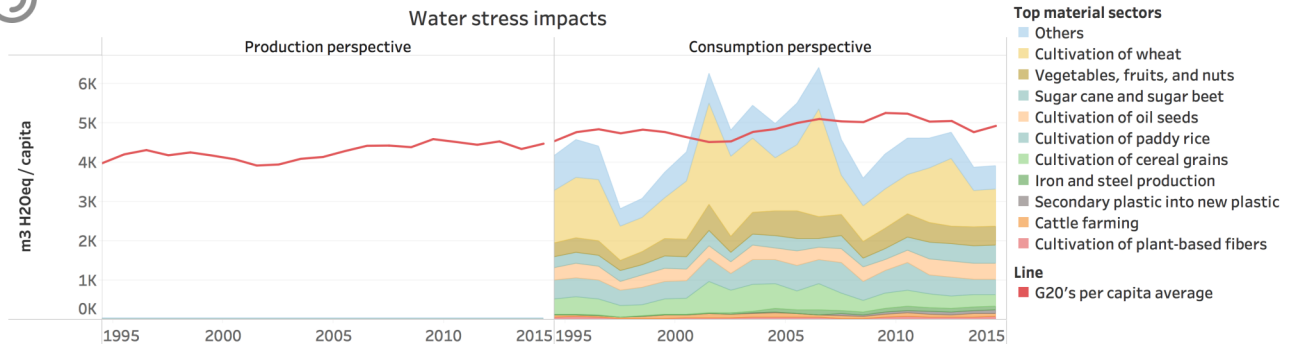


*Data after 2011 was nowcasted.

Source: IRP database, Exiobase v3.4, Cabernard et al. 2019



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

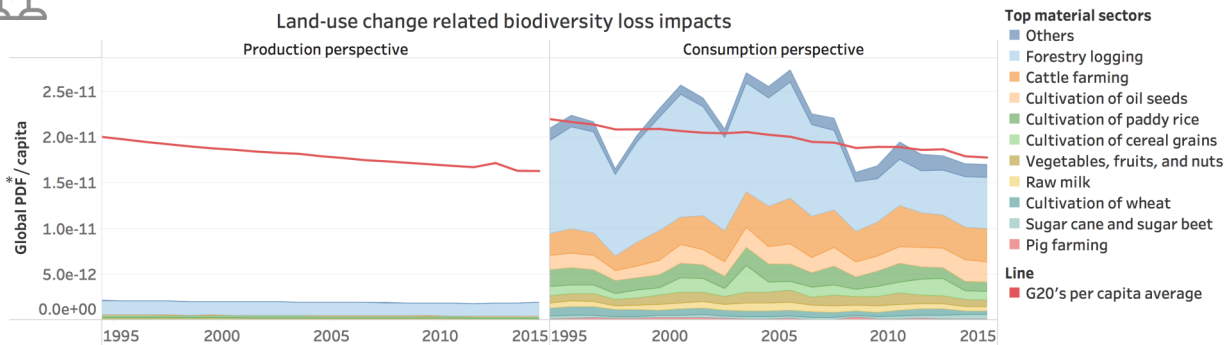


*Data after 2011 was nowcasted.

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 Korea (1995-2015)*



*Data after 2011 was nowcasted.

*PDF: Potentially disappeared fraction of species

Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

- Most material-related climate change impacts were caused by the production of iron and steel, chemicals, cement, coal and lignite mining and petroleum refining. The construction sector, the machinery manufacturing industry, and chemical refineries were the largest end-using sectors of high-impact materials.
- From a production perspective, climate change impacts were almost 50% higher than the G20 average. From a consumption perspective, they were 80% higher than the G20 average. This difference is mainly due to imports of crude oil, coal, beef and rice.
- The construction sector, the machinery manufacturing industry, and chemical refineries caused the largest share of material-related climate impacts.
- Minerals played a key role for South Korea's automobile, electrical, and electronics industries; as well as for the construction sector.
- From a production perspective, water stress remained low due to low irrigation requirements and low water stress. From a consumption perspective, water stress levels was similar to the G20 average, with high fluctuations due to food imports, especially wheat.
- From a production perspective, land use-related biodiversity loss was much lower than the G20 average. From the consumption perspective, land use-related biodiversity loss was comparable to the G20 average. Imported products from forestry, cattle farming, and oil seed cultivation are the main causes of this loss.

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)

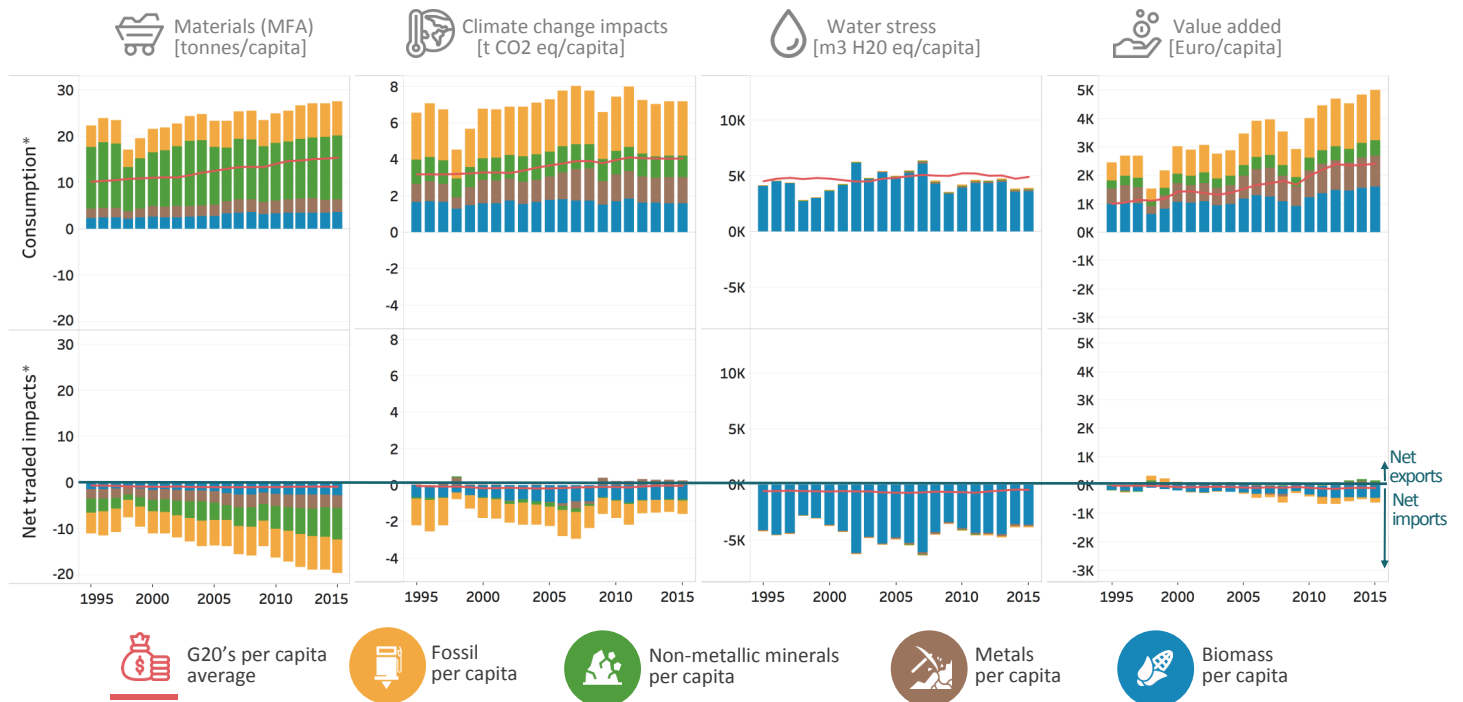
Material-related impacts: Impacts related to the extraction and processing of material resources (including the upstream supply chain, such as electricity generation and transport)

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 Korea (1995-2015)*







*Data after 2011 was nowcasted.






*Consumption: Impacts throughout the supply chain from goods imported and consumed in South Korea.

*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 Korea is a net importer of all material types.
-  More environmental impacts are caused by material imports than by material exports.
-  Almost all water consumption impacts occur outside of South Korea.
-  The net value added for traded materials was rather low.

FUTURE TRENDS AND POTENTIAL DECOUPLING

-  Scenarios developed by the IRP forecast a GDP increase of 128% to 145% and a slight decrease of population of 6% to 12% until 2060.
-  If ambitious resource efficiency policies are introduced, South Korea could see almost zero growth of domestic material extraction and domestic material consumption until 2060.
-  Per-capita material-related climate change impacts have slightly increased in the past two decades and material footprint and climate change impacts per capita remain high compared to the G20 average. Resource efficiency strategies along the entire supply chain including material use are critical, especially for fossils and food products.
-  South Korea still relies heavily on fossils as an energy source. More renewable energies, a rapid exit from coal, and less natural gas-based power production would decrease the impacts of fossil extraction and metal and mineral processing.
-  Material efficient urban design and circular economy solutions could help lower the material-use related climate change impacts of the construction sector.

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.