Indicator 8.4.1/12.2.1

SDG and Environment Statistics Unit - UNEP

SDG Target 8.4 and Indicator 8.4.1

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment an decent work for all

Target 8.4:

"Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead"

Indicator 8.4.1:

"Material Footprint, material footprint per capita, and material footprint per GDP"

UNEP is the custodian agency for this indicator

SDG Target 12.2 and Indicator 12.2.1

Goal 12: Ensure sustainable consumption and production patterns.

Target 12.2:

"By 2030, achieve the sustainable management and efficient use of natural resources"

Indicator 12.2.1:

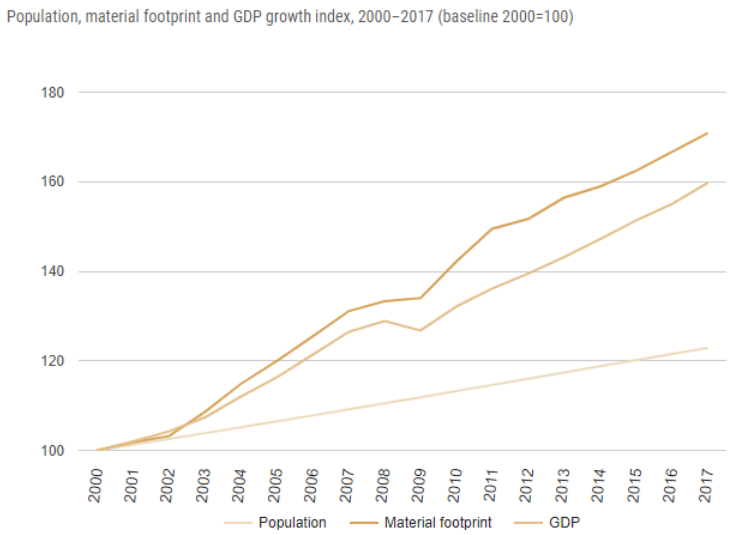
"Material Footprint, material footprint per capita, and material footprint per GDP"

UNEP is the custodian agency for this indicator

Introduction

- "Material footprint" refers to the total amount of raw materials extracted to meet final consumption demands.
- It is one indication of the pressures placed on the environment to support economic growth and to satisfy the material needs of people.
- The global material footprint rose from 43 billion metric tons in 1990 to 54 billion in 2000, and 92 billion in 2017—an increase of 70 per cent since 2000, and 113 per cent since 1990. The rate of natural resource extraction has accelerated since 2000. Without concerted political action, it is projected to grow to 190 billion metric tons by 2060.

Introduction



The global material footprint is increasing at a faster rate than both population and economic output. In other words, at the global level, there has been no decoupling of material footprint growth from either population growth or GDP growth. It is imperative that we reverse that trend.

Domestic Material Consumption (DMC) and MF need to be looked at in combination as they cover the two aspects of the economy, production and consumption.

Why is this SDG Important?

- Material Footprint is important for understanding resource efficiency and decoupling of resource use and economic growth.

Definition

- **Material Footprint (MF) -** is the attribution of global material extraction to domestic final demand of a country.
- **Total material footprint -** is the sum of the material footprint for biomass, fossil fuels, metal ores and non-metal ores.

Limitations

The global material flows database is based on country material flow accounts from the European Union and Japan and estimated data for the rest of the world.

Methodology - Approach

Input-output based approach

- Based on an economic multi-regional input-output (MRIO) model, which integrates physical data on material extraction (extension)
  - Identifies the final consumer of a specific amount of materials extracted domestically or anywhere in the world
  - Estimates the distribution across countries of raw materials embodied in final demand.
  - UNEP uses the EORA MRIO framework developed by the University of Sydney, Australia; method based on I-O analysis (Wiedmannet al. 2015)
- Estimations use data on material extraction obtained from national or international datasets (agriculture, forestry, fisheries, mining and energy statistics).
- International statistical sources for DMC and MF include the IEA, USGS, FAO and COMTRADE databases.

Methodology - Approach

International consensus and harmonisation of method

- OECD initiative with UN Environment Programme and Eurostat to achieve consensus
  - Other calculation methods exist: coefficient based; hybrid (e.g. Eurostat)
  - **Consensus on input-output approach for international work**
  - Harmonised methodology and guidance being developed (OECD)

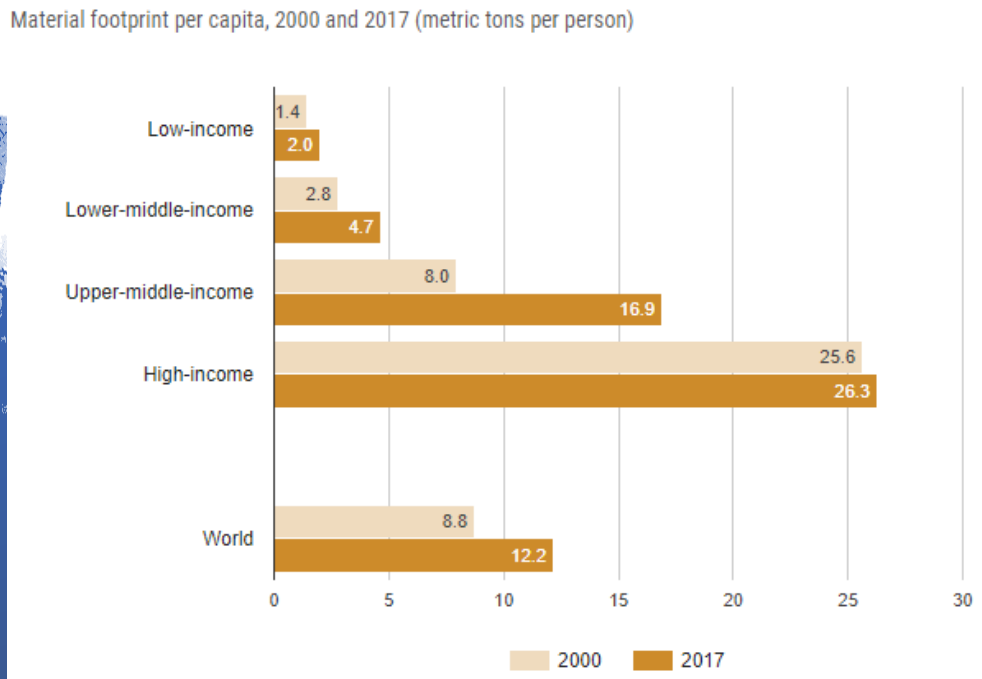
Methodology – Computation method

Material Footprint (MF)

Data

- Data sources – IEA, USGS, FAO and COMTRADE databases.
- Data will be made available for more than 170 countries and covers each nation over a time period of 27 years (1990 – 2017)
- Process of data collection is still under discussion.
- Data compilers – UNEP, OECD and EUROSTAT

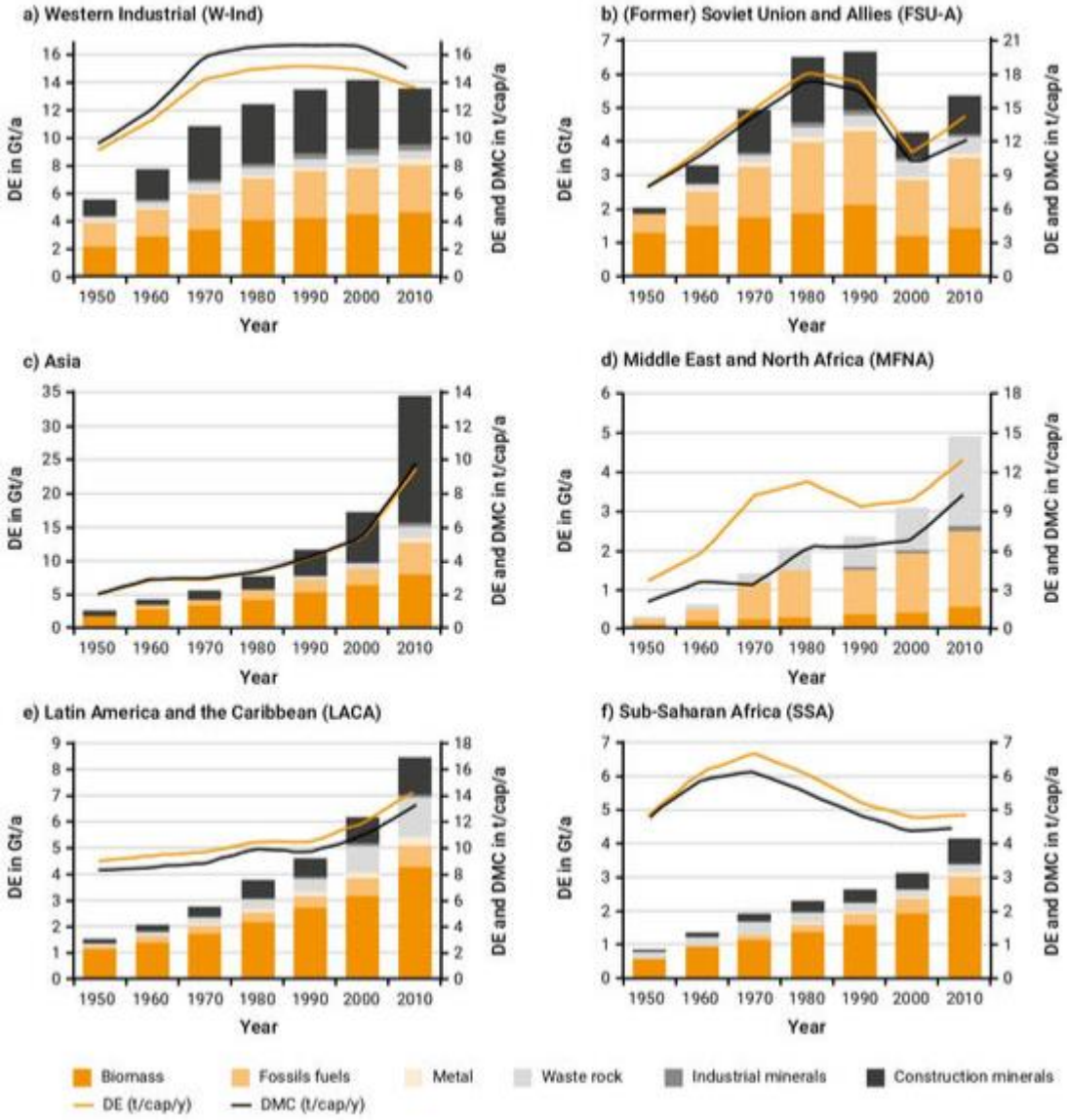
Example



The lifestyles of people in the richest nations are heavily dependent on resources extracted from poorer countries

The material footprint per capita has also increased at an alarming rate. In 1990, about 8.1 metric tons of natural resources were used to satisfy an individual's needs. In 2017, that rose to 12.2 metric tons, an increase of 50 per cent. That year, high-income countries had the highest material footprint per capita (approximately 27 metric tons per person), 60 per cent higher than the upper-middle-income countries (17 metric tons per person) and more than 13 times the level of low-income countries (2 metric tons per person). The material footprint of high-income countries is greater than their domestic material consumption, indicating that consumption in those countries relies on materials from other countries through international supply chains. On a per-capita basis, high-income countries rely on 9.8 metric tons of primary materials extracted elsewhere in the world.

Example

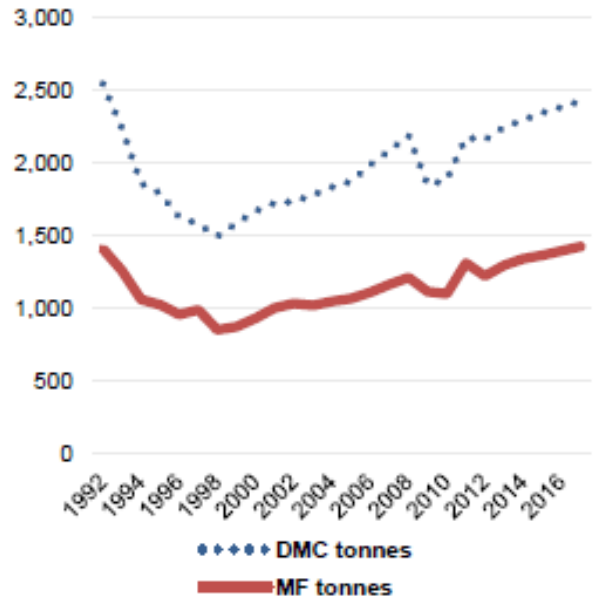


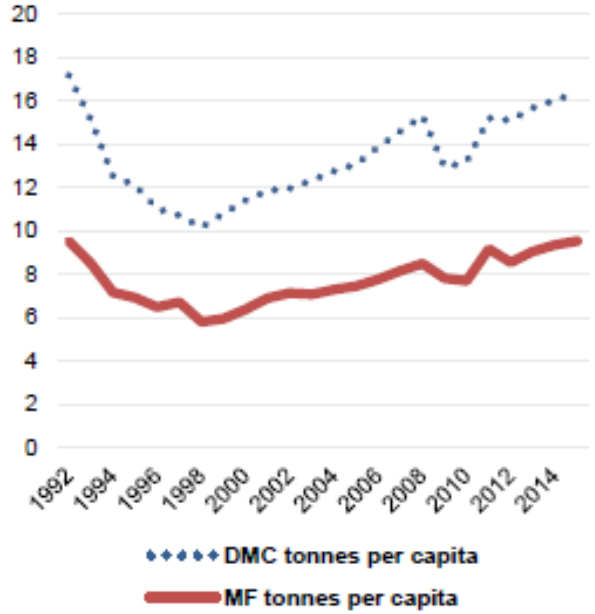
Domestic extraction and Domestic material consumption

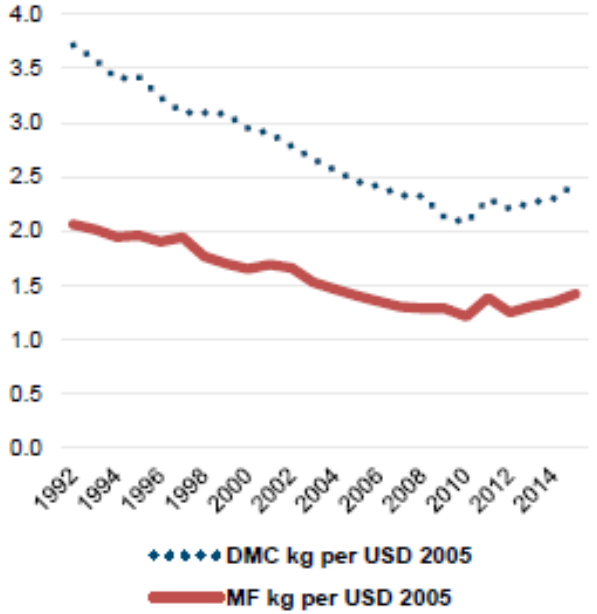
The figure shows data on extraction, trade, and apparent consumption of materials for six regions in Gigatonnes/ year (Gt/a) and in per capita values/ year (t/cap/a)

Source:Schaffartzik et al. (2014)

Example


RUS | DMC & MF | million tonnes | 1992-2017
3,000
2,500
2,000
1,500
1,000
500
0
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
DMC tonnes
MF tonnes


RUS | DMC & MF per capita | tonnes per capita | 1992-2015
20
18
16
14
12
10
8
6
4
2
0
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
DMC tonnes per capita
MF tonnes per capita


RUS | DMC & MF intensity | kg per 2005 USD | 1992-2015
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
DMC kg per USD 2005
MF kg per USD 2005

Summary

- The Material Footprint methodology has been used by the countries and experts in the International Resource Panel.
- The information on Material Footprint was shared with countries during testing of the Global Manual on Material Flow Accounts in Chile, Laos, Philippines and South Africa.
- The DMC reports the actual amount of material in an economy, MF the virtual amount required across the whole supply chain to service final demand.

UN environment programme

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