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PBL Note

The size and impact of the Dutch footprint on the planet

Mark van Oorschot, Trudy Rood, Edward Vixseboxse, Harry Wilting and Stefan van der Esch

Corresponding author:
mark.vanoorschot@pbl.nl
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Introduction

Everyone uses natural resources, and the land required to produce these resources is often metaphorically referred to as the footprint. This metaphor has helped to make many people aware of the consequences of their consumption behaviour.

Awareness of the Dutch footprint has led to initiatives and debate by various social parties and in policy. In the Biodiversity Policy Programme (Beleidsprogramma Biodiversiteit, 2008-2011), the Dutch Cabinet responded to the environmental impact of the Dutch footprint elsewhere on the planet. One of the priorities in this policy programme and in the Cabinet's Sustainability Agenda (Duurzaamheidsagenda, 2011) is stimulating the sustainability of the international supply chain to reduce the environmental impact of Dutch consumption in other countries.

At the end of 2011, the multi-stakeholder Taskforce on Biodiversity and Natural Resources recommended to the Dutch Cabinet that the Dutch footprint be halved by 2030. According to the taskforce, reducing the footprint will contribute to green growth and sustainable development. The government has promised to respond to the taskforce's recommendations.

To gain insight into the sustainable development of the Netherlands, a method is required to monitor further development of the Dutch footprint. PBL published a report that provides information on developing such a method and the required indicators. The report describes the footprint of Dutch consumption and its ecological consequences, and presents options for reducing the footprint. A set of indicators is proposed for describing various aspects of the footprint as a basis for priority setting and making policy choices.

The Dutch Cabinet's policy on sustainable supply chains is presented in several policy programmes prepared by various ministries, and thus the scope is wider than reducing only the ecological impacts of the Dutch footprint. A key question for this report is, therefore, whether reducing the geographical extent and impact of the footprint is in line with present policy on sustainable supply chains.

The ecological footprint has put the increasing global use of natural resources on the agenda

Worldwide increase in consumption goes hand in hand with an increased use of natural resources such as energy, food, fibres and water. The indicator most often used to illustrate the consequences of consumption for the environment and biodiversity is the ecological footprint of the Global Footprint Network (GFN), and is widely used in publications by WWF. The indicator has made many people aware of the consequences of their consumption behaviour and has called worldwide attention to this issue, including the increasing use of renewable natural resources, scarcity of raw materials, and the negative environmental impacts of production.

According to the GFN ecological footprint, current global consumption exceeds the bio-capacity of the planet, that is to say, every year more use is made of these resources than the various producing ecosystems can deliver. Sustainable use of global resources takes account of the annual replenishment of stocks. The footprint indicator further shows differences in footprint between countries. Not all inhabitants of different countries use the same quantities of resources. Thus, WWF calls for a reduction in the global footprint to the annual renewable capacity, and for a fairer distribution of resource use by people throughout the word.

What is the footprint and how can it be used in policy?

The footprint indicator may provide useful information for policy; for example, where choices have to be made about energy and land use, or for sustainable management and use of natural resources.

However, the ecological footprint is often presented as an aggregated index with a number of disadvantages that limit its usefulness in various related policy areas. For instance, this index contains general assumptions, such as on worldwide average yields in agriculture, which are not representative of the yields actually attained in the different countries and do not give information on the associated environmental loads due to agriculture. The aggregated footprint index also includes the amount of land (forest) needed for the uptake of greenhouse gas emissions related to fossil energy use. However, this is only an estimate. The land is not specifically used for this purpose, and in addition, greenhouse gas emissions do not necessarily have to be compensated for in this way. There are other methods of sustainable energy use, such as energy savings, and the use of solar and wind energy.

PBL has divided the footprint into 12 indicators to give better insight into the actual pressures on the planet and the causes and effects. This approach is useful for various policy areas. The indicators subsequently have been divided into three interrelated categories: stocks, environmental pressure and impacts (see Figure 1). For instance, people use stocks of fossil fuel such as oil, which puts pressure on the environment in the form of greenhouse gas emissions, which in turn have an impact on climate.

Using these categories, the footprint can be assessed for different policy themes, such as climate change, resource use, water management, and biodiversity loss. Where possible, the indicators on the use of different stocks may be compared with the capacity of ecosystems to replenish their stocks. Relationships between themes can also be shown with the disaggregated indicator set, such as for the use of bio-energy, which reduces greenhouse gas emissions but at the same time increases land use.

Although the indicators give a clearer picture of the Dutch footprint than does an aggregated index, they do not provide the complete picture of the total impact of the Dutch economy on natural resource use, as the footprint considers only consumption. The Netherlands, however, also imports raw materials and products that are transhipped or processed into semi-processed products for export.

An important message of the footprint is that humanity has to operate within the planet's natural boundaries. But the limits for the use of various stocks and the environmental impacts are not always known precisely. There is still a large amount of land in the world suitable for agriculture, but using these areas would be at the expense of natural areas and their biodiversity.

The exact amount of land needed for maintaining viable populations of all species is not known. Given these uncertainties, policymakers need to make choices about the use of globally available land for different purposes (competing claims), such as housing/living, work, production of food, fibres and fuel, carbon storage and nature. There are also choices to be made for energy generation. Instead of scientifically defined limits, there are globally agreed quantitative policy objectives, such as limiting temperature rise to 2 0C by 2100, and safeguarding and protecting 17% of the area of different ecosystems worldwide.

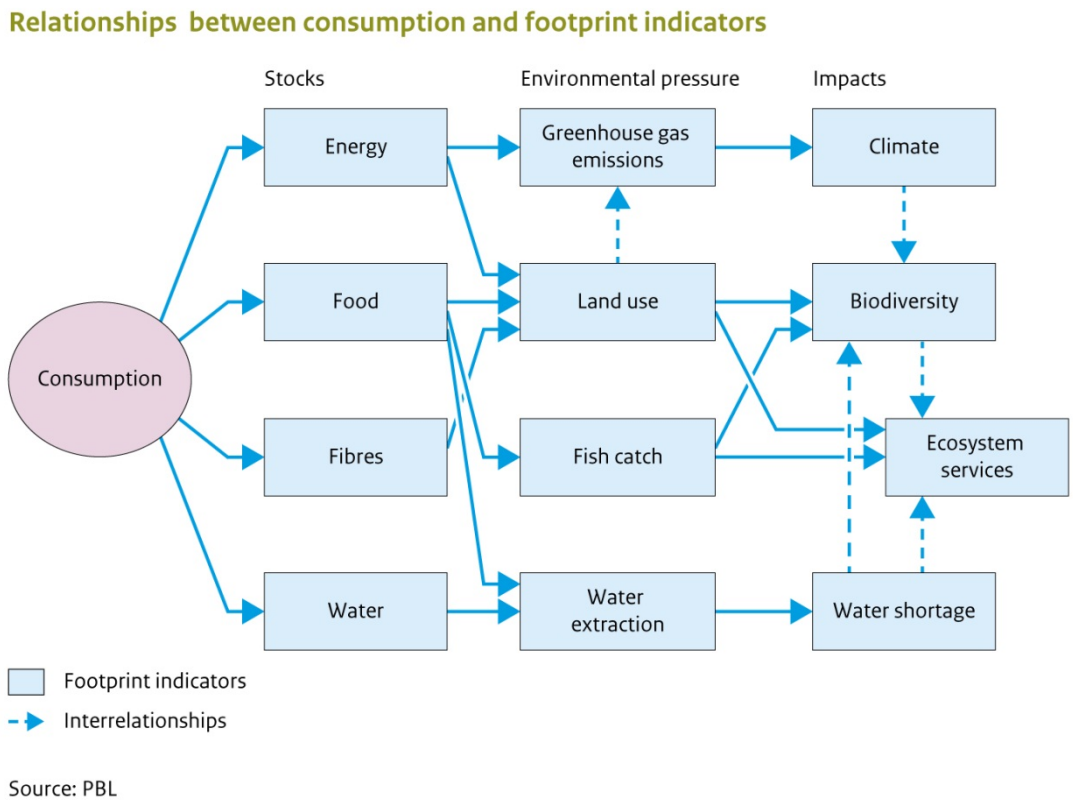


Figure 1.

The set of indicators for the ecological footprint of consumption provides information on both the size (geographical area) and the impact of the footprint (local environmental impacts). The use of global stocks of natural resources, the resulting environmental pressure and the ecological impacts must be taken into consideration in policy prioritisation.

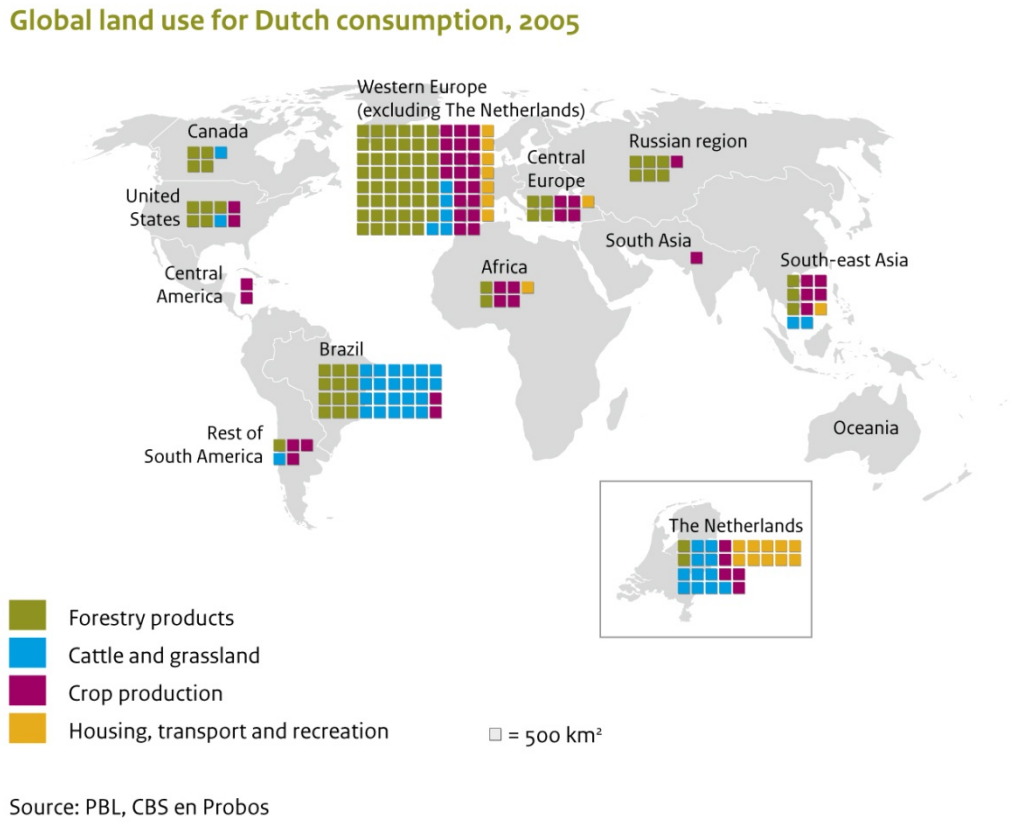
Land use and greenhouse gas emissions are central parts of the indicator set. Indicators have also been developed for the effects of water use in production regions and for the effects of land use on biodiversity. In this diagram, land use stands for various types of environmental pressure: habitat conversion, fertiliser use, pollution, desiccation, fragmentation and disturbance. Water use covers both direct use (drinking water and other domestic uses) and indirect use (food production and product processing).

What is the extent and impact of the Dutch footprint?

The land area needed to meet Dutch consumption requirements in 2005 (by citizens and government) was estimated to be three times the land area of the Netherlands (see Figure 2). The largest portion of this area, obviously, is outside the country's borders (about 85%). Land use per person is close to the global average because relatively intensive production methods are used to produce the goods for Dutch consumption. Land-based production consists mainly of food (plant and animal), paper and wood. As the main share of land use is outside the Netherlands, internationally oriented policy is needed with regard to the impacts of raw material production. Land used in the Dutch footprint is located mainly in OECD countries (about 65% including the Netherlands), about 25% in the large transition economies (BRIICS: Brazil, Russia, India, Indonesia, China and South Africa), and the rest in other

countries including the Middle East and developing countries (see also Figure 2). Use of biomass for energy generation is still limited in volume but will increase depending on the ambitions and objectives for sustainable energy provision.

Dutch consumption also results in a relatively large share of global greenhouse gas emissions compared to the world average. Emissions that contribute to the carbon footprint come mainly from domestic energy use (40%, at home and for mobility; see Figure 3). Half of the greenhouse gas emissions caused by Dutch consumption take place within the country and the other half outside its borders (25% in other OECD countries and almost 20% in the BRIICS countries). This distribution indicates that there is much potential in national energy policy to change the climate impacts of the footprint.



Source: PBL, CBS en Probos

Figure 2.

Land use related to consumption by Dutch citizens and the government, in 2005, amounted to an area three times the size of the Netherlands. This includes the area required for forestry, agriculture and livestock farming. The largest amount of land use (about 85%) is outside the national borders, for which internationally oriented policy is required.

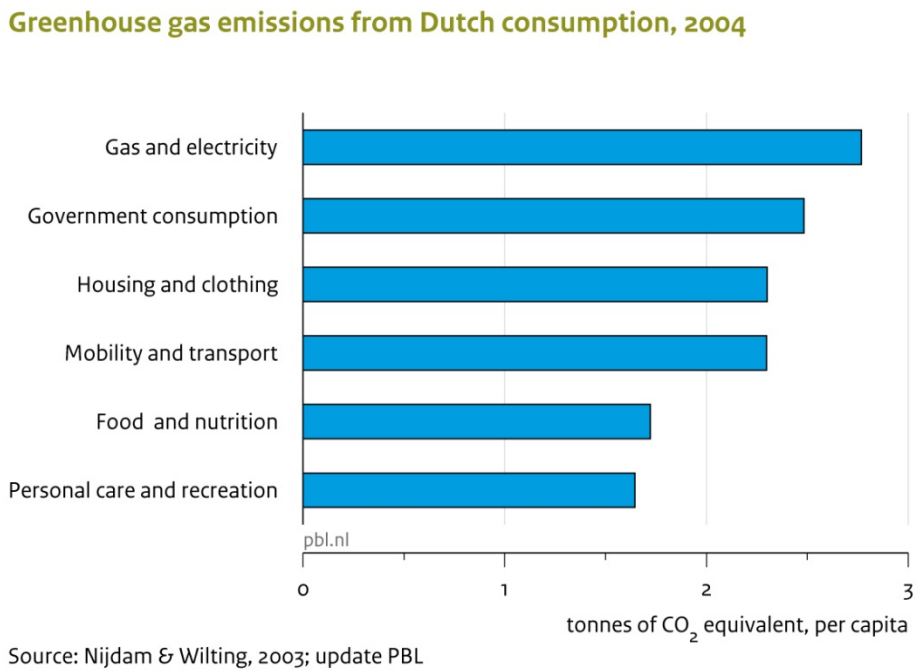


Figure 3.

About 40% of greenhouse gas emissions resulting from Dutch consumption are from domestic energy use (gas and electricity) and from mobility. Approximately half of these emissions occur within the borders of the Netherlands and the government can take action through national policy.

Consumption also has an impact on biodiversity in production areas. The impact is particularly large where intensive production methods are employed, such as in crop production that replaces naturally occurring ecosystems. Animal feed production, such as of soy and grains, also puts a relatively heavy pressure on biodiversity. Meat production involves grazing herds on natural grasslands, for instance in South America. Although it puts relatively less pressure on local biodiversity, this extensive method requires much land; in other words, it results in a relatively large footprint with less local impact.

Not only are many resources consumed in the Netherlands, but a large amount is also imported, processed and exported. The Netherlands is an important trade and transit country. The main agricultural raw materials imported into the Netherlands, in monetary terms, are soy, cacao and palm oil. Trade in raw materials and semi-processed products is growing more rapidly than is domestic consumption. The environmental impacts of these trade flows are even greater for some raw materials than the impacts of consumption alone. For instance, soy import and processing in the Netherlands is largely destined for meat production for export.

Options to reduce the footprint are to be found throughout the supply chain

Reducing the footprint requires options for both limiting the use of natural resources (reducing the size of the footprint) and for reducing the ecological impacts associated with processing goods (reducing the impact of the footprint). There is potential to reduce the footprint of Dutch consumption throughout the whole supply chain – in

primary production, wholesale and distribution, the processing industry, as well as in final consumption. Three categories of options have been identified for different actors to contribute to a smaller footprint: (1) reducing local environmental impacts of production; (2) more efficient production, requiring less land or other types of raw materials; and (3) making different choices in the consumption pattern.

Land use can be reduced by increasing agricultural production with the aid of fertilisers. In cases where agriculture already uses more intensive methods, local environmental impacts may be reduced, for example, by using natural means instead of pesticides to combat pests. Agriculture can make more efficient use of water by applying drip irrigation. And an example of a change consumption pattern that would reduce environmental impact relates to the consumption of less animal protein.

Options to reduce the footprint cannot entirely be implemented in isolation and, therefore, may have unintended side effects, which may be either positive (synergies) or negative (trade-offs). Reducing the consumption of animal protein, for instance, may contribute to human health. Increasing the use of bio-energy means fewer greenhouse gas emissions but more land use. Options, thus, may have 'rebound' effects that can partly nullify the expected environmental benefits. For instance, the availability of more energy-efficient domestic appliances may lead to their more frequent use. Simply reducing the footprint may lead to one-sided solutions; therefore, side effects need to be analysed before policy choices can be made.

Policy objectives: reduce the footprint or make the supply chain sustainable

The Dutch Government intends to reduce the impacts of the footprint by making international supply chains sustainable. This is a priority in the policy programmes of different ministries (Biodiversity Policy Programme 2008-2011, Sustainability Agenda, policy document on resource supply, Focus letter on Development (all from 2011), and recently the policy document 'What the world deserves: A new agenda for aid, trade and investment' (2013).

From these policy programmes, the following ambitions can be derived for the issue of sustainable supply chains: securing and guaranteeing the supply of raw materials to the Netherlands; enabling responsible production; and contributing to sustainable socio-economic developments elsewhere.

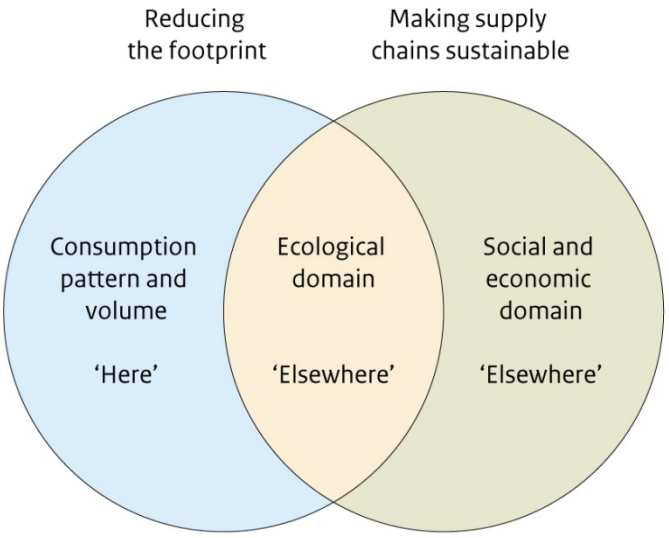
The Dutch policy framework for development and cooperation refers to a number of preferred partner countries. Some of these countries are economically dependent on the export of their agricultural raw materials. For instance, more than 40% of exports from Burundi and Rwanda consist of tea and coffee. Cacao accounts for a major part of Ghana's exports (about 25%). Making supply chains from these countries more sustainable may present opportunities to contribute to development in these countries.

Thus, making supply chains more sustainable has a broader perspective than merely reducing the ecological impacts. It refers to the three different domains of sustainability (see Figure 4), as Dutch Government policy objectives not only include ecological aspects, but also relate to issues such as social conditions associated with production and animal welfare.
The recommendations of the Taskforce on Biodiversity and Natural Resources add the objective of operating within the global capacity of available ecosystems. They also envisage that changing the consumption pattern is an important option.

The different solutions indicated by the government (to make supply chains more sustainable) and the taskforce recommendations to reduce the footprint partly overlap, particularly in the area of ecology (see Figure 4).

Pursuing the many different Dutch policy ambitions requires a robust and integrated approach that takes into account all elements of the supply chains, and one in which various options are combined and stimulated. Elements include improving production practices, more efficient processing of raw materials, and changing the consumption patterns of the Dutch population. The government is committed to reducing the impacts in the various production locations and achieving more efficient production processes. Changing consumption patterns, however, is currently not included in the policy on sustainable supply chains.

Overlap in ambitions for reducing the footprint and making supply chains sustainable



Source: PBL

Figure 4.

The footprint may be reduced by limiting the ecological impacts of consumption on climate, biodiversity and water availability 'elsewhere', and by changing consumption patterns 'here'. Government policies on the Dutch footprint are focused primarily on making supply chains more sustainable. Dutch International policy on sustainable supply chains comprises ambitions to reduce impacts on the environment and on social conditions 'elsewhere'. An important motivation is securing the supply of imported raw materials. Both policy themes show overlap in the area of ecology. However, consumption patterns also need to change, in order to reduce the footprint, but this is currently not part of government policy.

Reference

This document is a summary of the Dutch report:
De Nederlandse voetafdruk op de wereld: hoe groot en hoe diep? By Van Oorschot M, Rood T, Vixseboxse E, Wilting H and Van der Esch S. (2012). PBL Netherlands Environmental Assessment Agency, Report number 500411002, The Hague.

The full report (in Dutch) can be downloaded from:

http://www.pbl.nl/sites/default/files/cms/publicaties/PBL_2012_De_Nederlandse_voetafdruk_500411002_0.pdf