AFRICA KNOWLEDGE PLATFORM

Life Cycle Thinking for our food

Unwrapping a chocolate bar made of West African cocoa

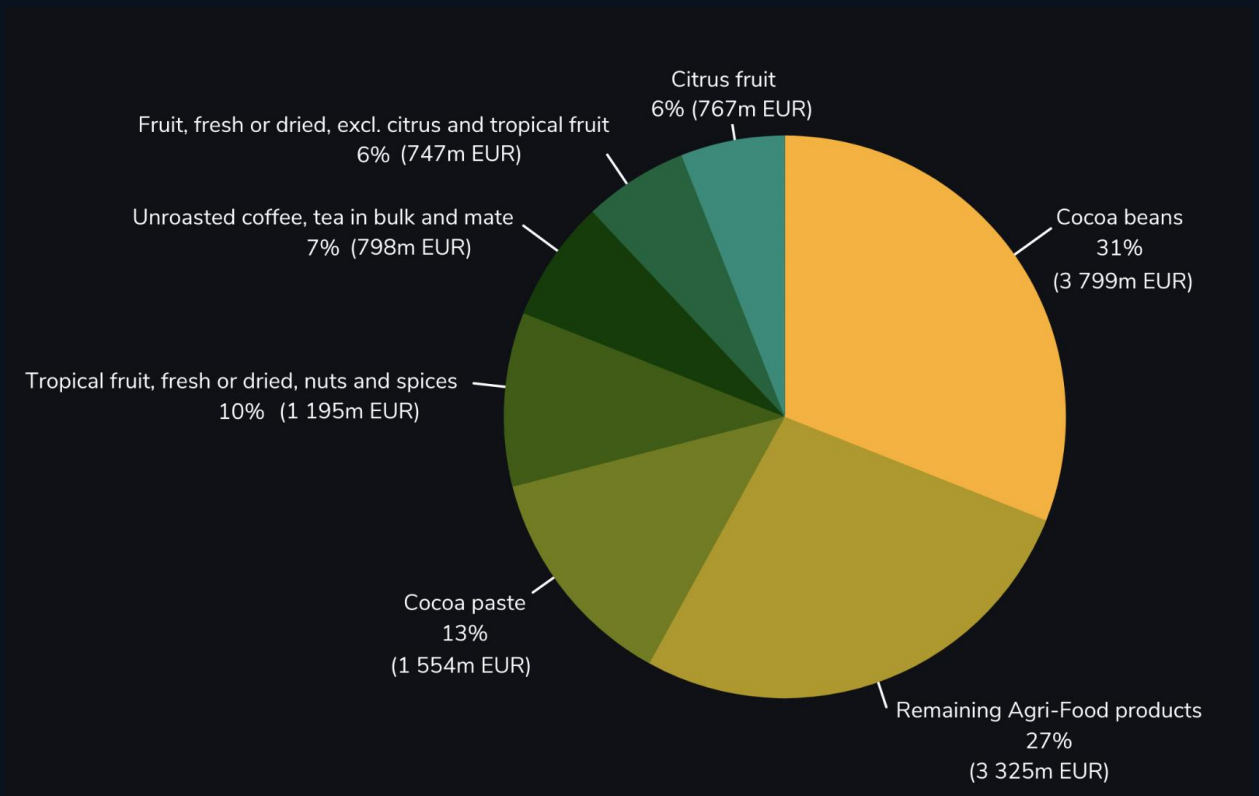
European Commission

Coffee and chocolate often accompany our feel-good moments. But do we ever think about the environmental footprint of those products? When we consider the energy required to melt and mould chocolate or manufacture and recycle the packaging, the transport of cocoa beans across land and ocean, the water needed for intensive cocoa farming as well as the deforested lands and the loss of biodiversity... the small dark square does not seem so sweet

Behind our food

Food is the area of consumption driving environmental impacts the most. Our food is produced in various places in Europe but also further away. Many commodities and goods come from developing countries – like cocoa, tropical fruits and coffee from Sub-Saharan Africa.

How can we measure the environmental impact of our food consumption? Can we calculate our consumer footprint and assess major steps in production? Are policies helping towards a sustainable use of resources? This story explores these questions with the example of African cocoa. Cocoa beans and paste account for nearly half of the top EU Agri-food imports from Sub-Saharan Africa.



Top EU Agri-food imports from Sub-Saharan Africa in 2020 (in terms of economic value).
Source: Agri-food trade statistical factsheet, March 2021 with data extracted from Eurostat

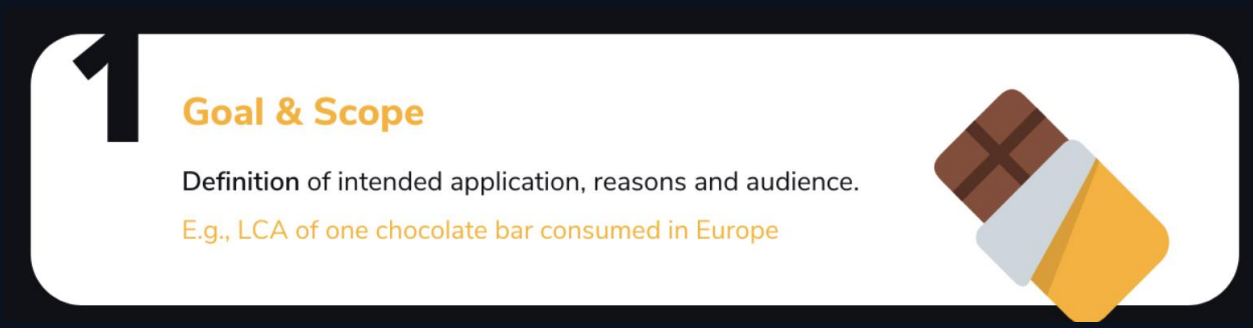
Life Cycle Assessment

How can we measure the impact of consumption? The European Commission's Joint Research Center (JRC) has developed the consumption footprint, a Life Cycle Assessment (LCA)-based framework to monitor EU consumption and evaluate the environmental impact of products along their value chain.

LCA is a reference method for appraising the environmental impacts of products, processes or services considering all stages along the life cycle: from the extraction of resources, through production, use, and recycling, up to the disposal waste.

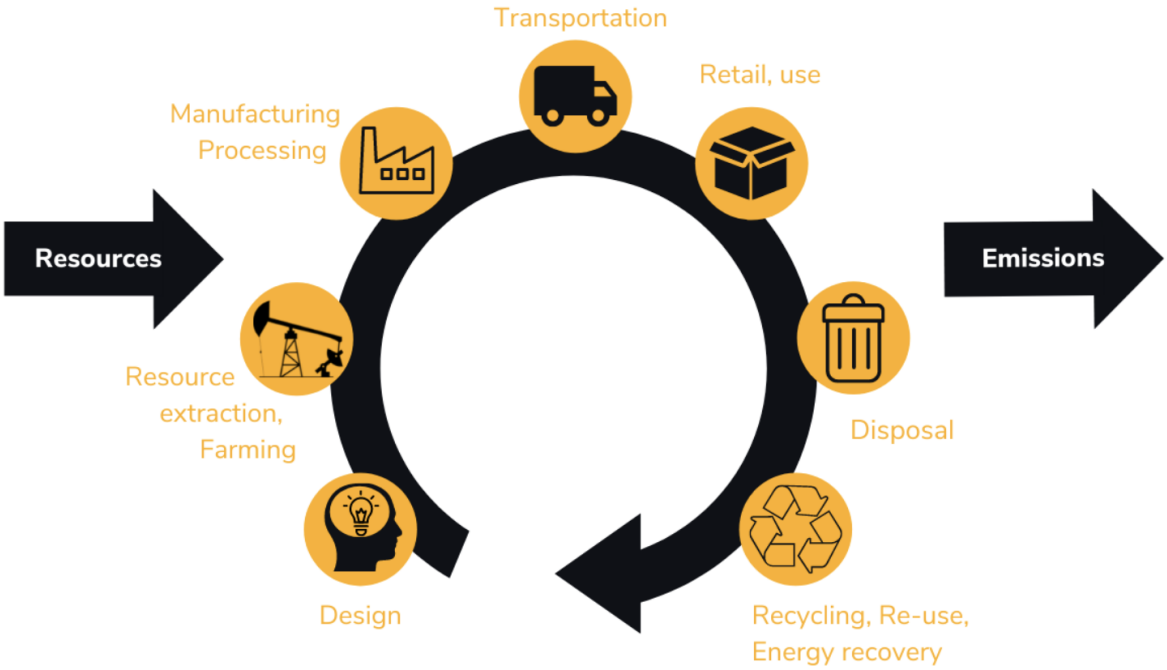
The impacts covered by the assessment are numerous: climate change, ozone depletion, human toxicity (cancer and non-cancer related), particulate matter, ionizing radiation and photochemical ozone formation impacts on human health, acidification, eutrophication of terrestrial, marine and freshwater environments, freshwater ecotoxicity, land use, water use, fossil and minerals & metals resource use. Assessing them all is fundamental to unveil possible trade-offs or burden shifting (e.g. low impact in one impact category while high impact in another).

A typical LCA analysis is based on four main phases:



2 Life Cycle Inventory

Data **collection** on inputs (resources used such as water, land or raw materials) and on outputs (emissions into water, air and soil).



3 Life Cycle Impact Assessment

Each inventory data (resource used or emission) may lead to an environmental impact (e.g. greenhouse gas emissions leading to climate change, or pollutant release leading to ecotoxicity). Resulting **impact indicators** can be presented as individual impacts or weighted into a single score.

4 Interpretation

The practical implementation of LCA depends on the specific needs. For example, the European Commission has developed an approach to compare different products and different organisations: the Product Environmental Footprint (PEF)

and the Organisation Environmental Footprint (OEF). The methodological steps of PEF and OEF ensure a robust and fair comparison.

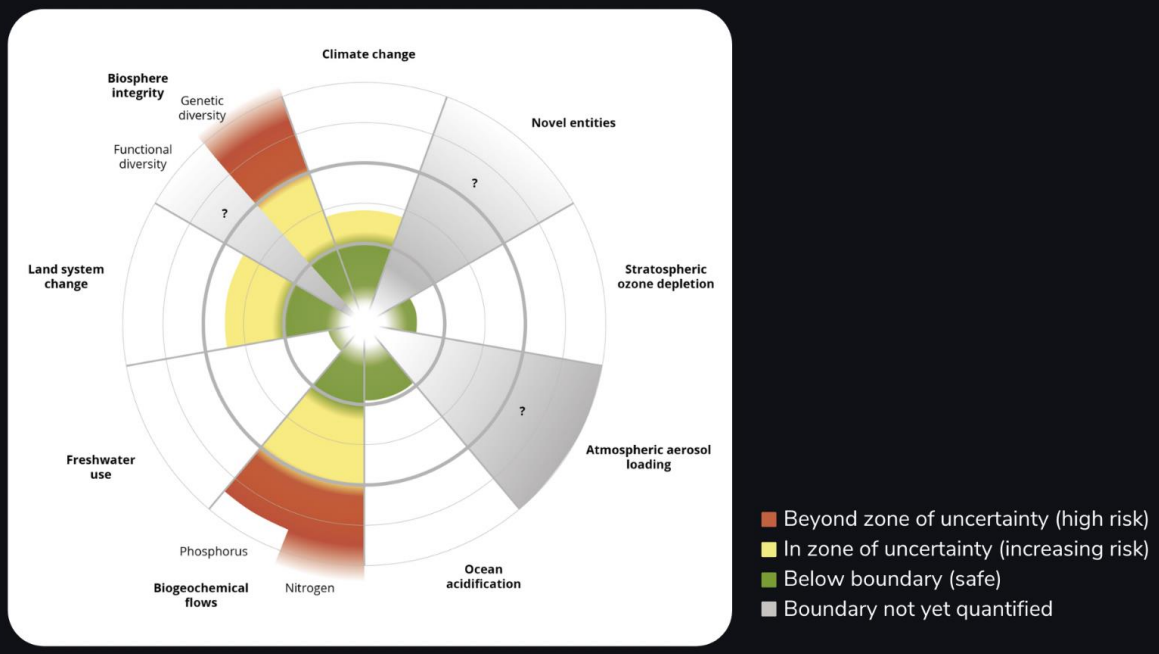
>>> Recommendations of the European Commission on the use of PEF and OEF

LCA can also be used at a macro scale, e.g. to assess the overall impacts associated with production and consumption patterns as well as the impacts of individual consumption patterns. The JRC has developed the Consumption Footprint, a specific LCA-based framework to perform this assessment.

>>> Technical report on the Consumption and Consumer Footprint

Planetary boundaries

The framework allows to compare the consumption or consumer footprint against the planetary boundaries - the Earth's ecological limits and carrying capacity that define a "safe operating space for humanity" - to unveil the level to which they are transgressed.



Status of the nine planetary boundaries (European Environment Agency, 2020)

>>> Find out more about planetary boundaries in this video by climate scholar J. Rockstrom .

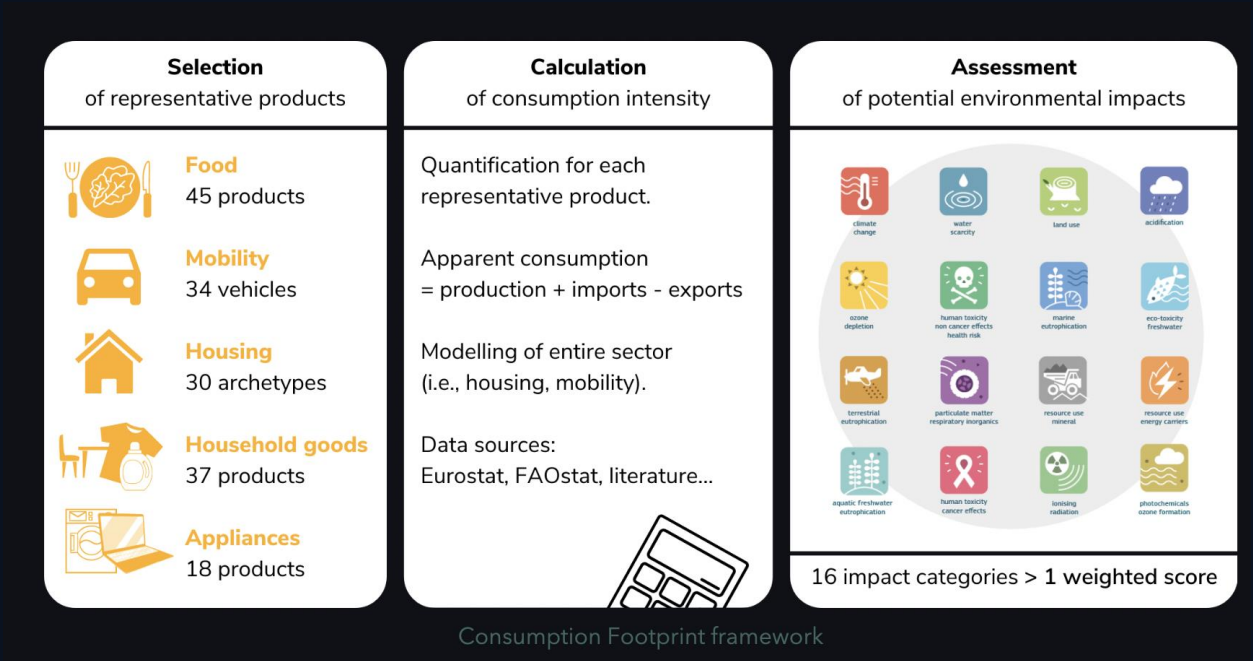
Consumption Footprint

The JRC has developed two specific LCA-based tools :

The Consumption Footprint Platform aims at assessing environmental impacts at country level (current application focus is European consumption).

The Consumer Footprint Calculator is focused on the environmental impact at individual level. It allows EU citizens to calculate their personal consumer footprint and evaluate the impacts of lifestyle changes.

Five areas of consumption are accounted for: food, housing, mobility, household goods, and appliances. Their life cycle impacts are categorised according to 16 environmental impact categories and indicators, then aggregated into a single overall score.



Consumption Footprint framework

The entire life cycle of the consumed products is considered i.e., all resources used and emissions to the environment taking place from the raw materials extraction to the end of life. Environmental impacts are allocated to the country where the product is consumed. Therefore, based on trade statistics, environmental impacts linked to the production of imported goods consumed in the EU are included in the analysis (whereas impacts of exported goods are not).

A closer look at the EU food basket

For food, the reference is the amount consumed by an average citizen in a year, based on apparent consumption (= production – export + import). The calculation of the environmental footprint considers a basket of 45 food products selected because they are:

- Relevant in mass and economic value (e.g., meat, apples, tomatoes)
- Highly imported products (e.g., bananas)
- Showing new trends in nutrition (e.g., products for vegetarian diets like tofu)
- Relevant in terms of environmental impacts (e.g., almonds, shrimps) and specifically on biodiversity (e.g., chocolate)

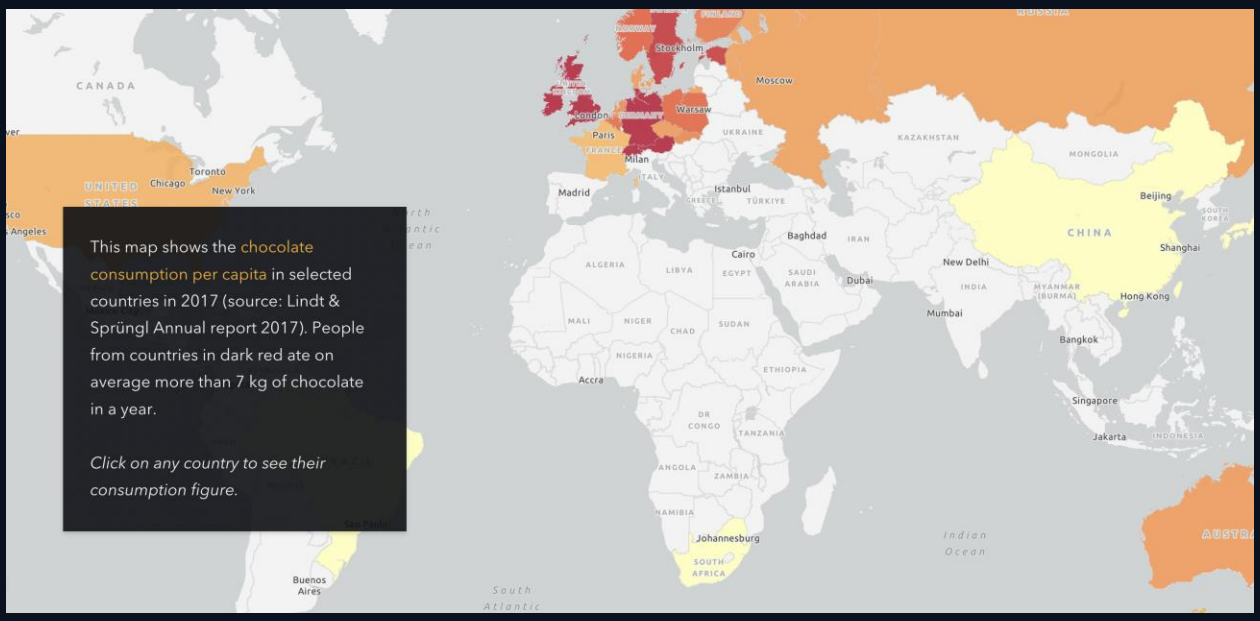
For fully imported products, like the cocoa beans used by European chocolate factories, the environmental impacts of both transport and cultivation (linked to practices and yields in the importing countries) are accounted for.

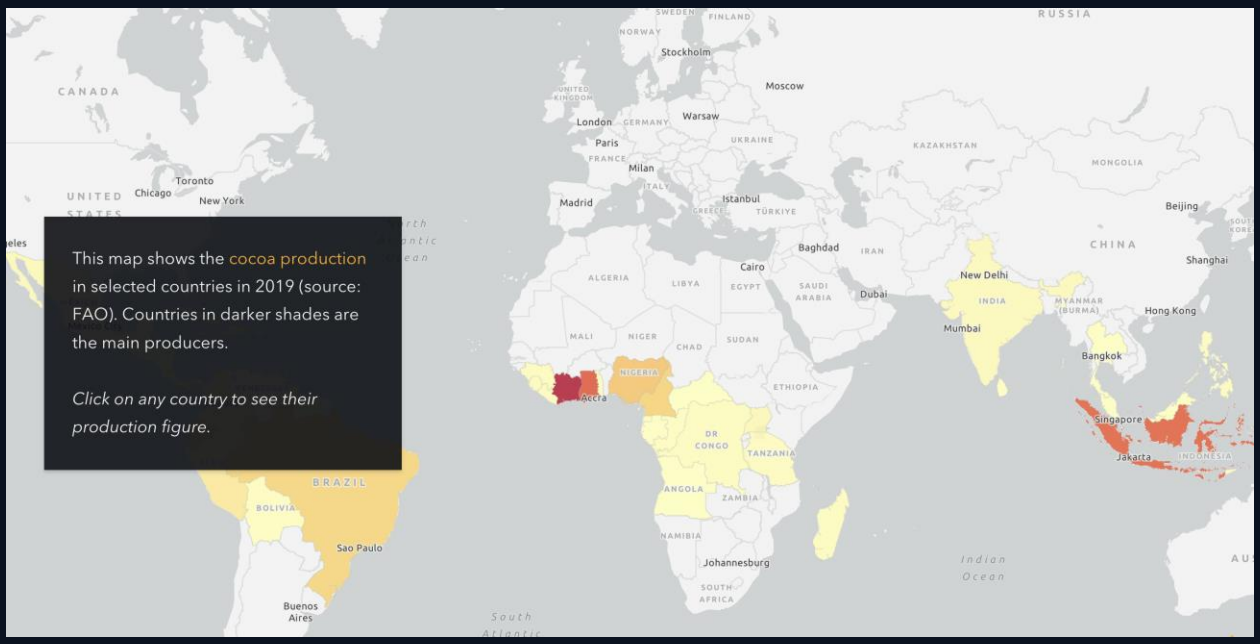
The cocoa case

The environmental footprint of EU chocolate consumption

The consumption of chocolate in the European Union is about 6 kg per person per year (Eurostat , 2018). The EU is the world's largest importer of cocoa, accounting for 60% of world imports (ITC , 2020). Cocoa commodities represent nearly half of the EU agri-food imports from sub-Saharan Africa, and they are on the rise (5% increase in 2019-2020; Eurostat , 2021).

Côte d'Ivoire and Ghana are major suppliers of cocoa into the EU market, and the world's largest exporters. Together with Cameroon, they generate almost 70% of the global production. Cocoa is a major contributor to export earnings, as well as the main source of livelihoods for up to six million farmers in Côte d'Ivoire and Ghana. Indirectly, cocoa contributes to the livelihoods of further 50 million people (UNCTAD , 2016).





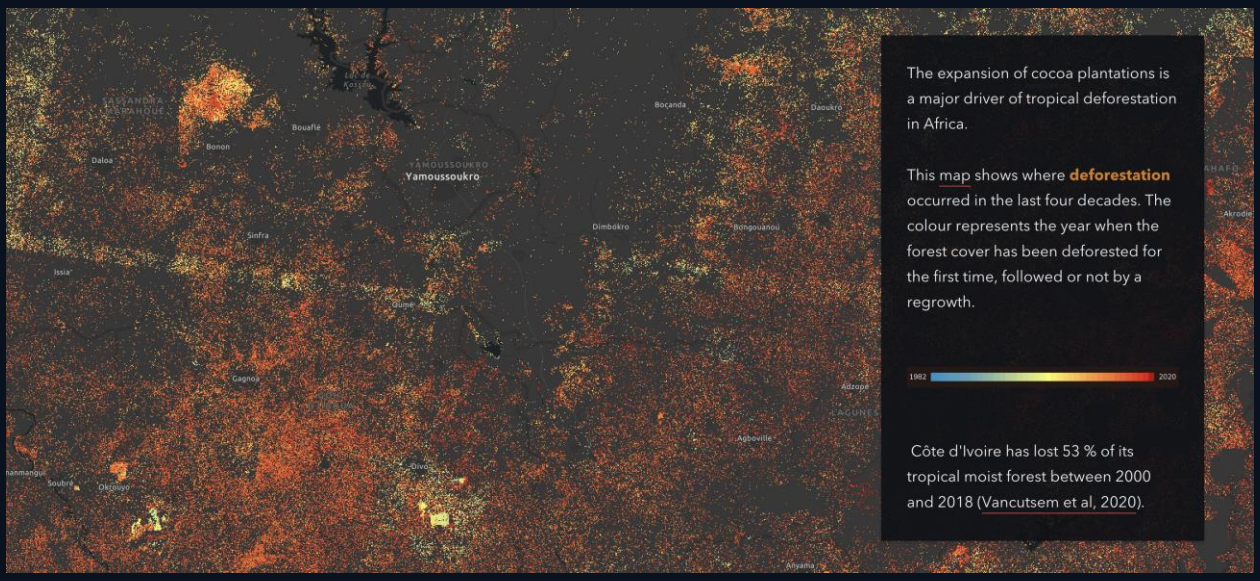
1. Life cycle Inventory of chocolate

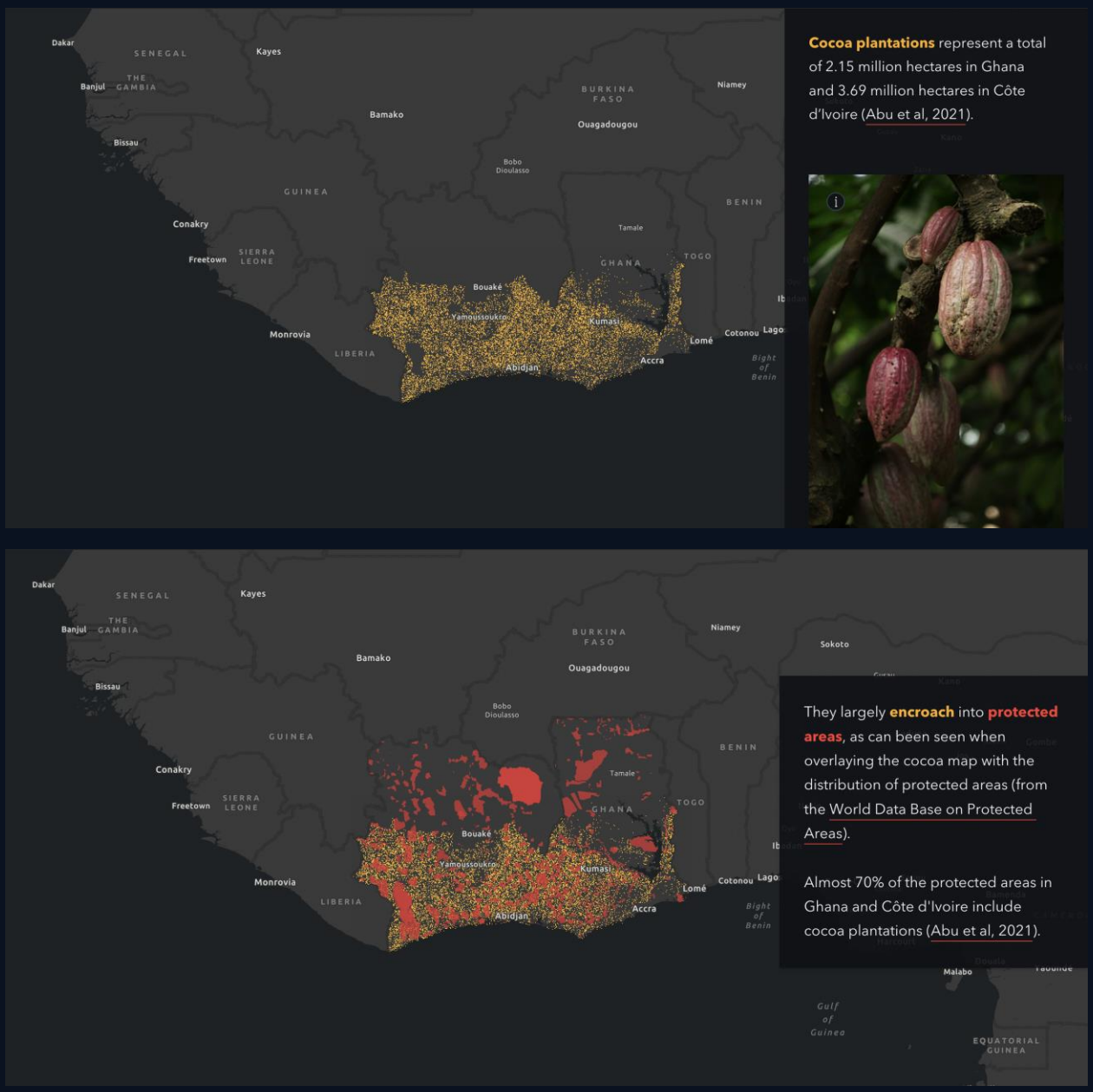
What is there to consider for analysing the value chain of 1kg of Belgian chocolate made from Ghanaian cocoa beans?

Let's have a closer look at a couple of these steps, as well as at the social and economic aspects of cocoa production.

2. Deforestation & biodiversity loss due to cocoa production

The cultivation of cocoa drives deforestation and forest degradation, which both lead to biodiversity loss and climate impacts. Other environmental impacts of cocoa production are also high and mainly due to the use of pesticides, which require mineral resources for their production and cause freshwater ecotoxicity.



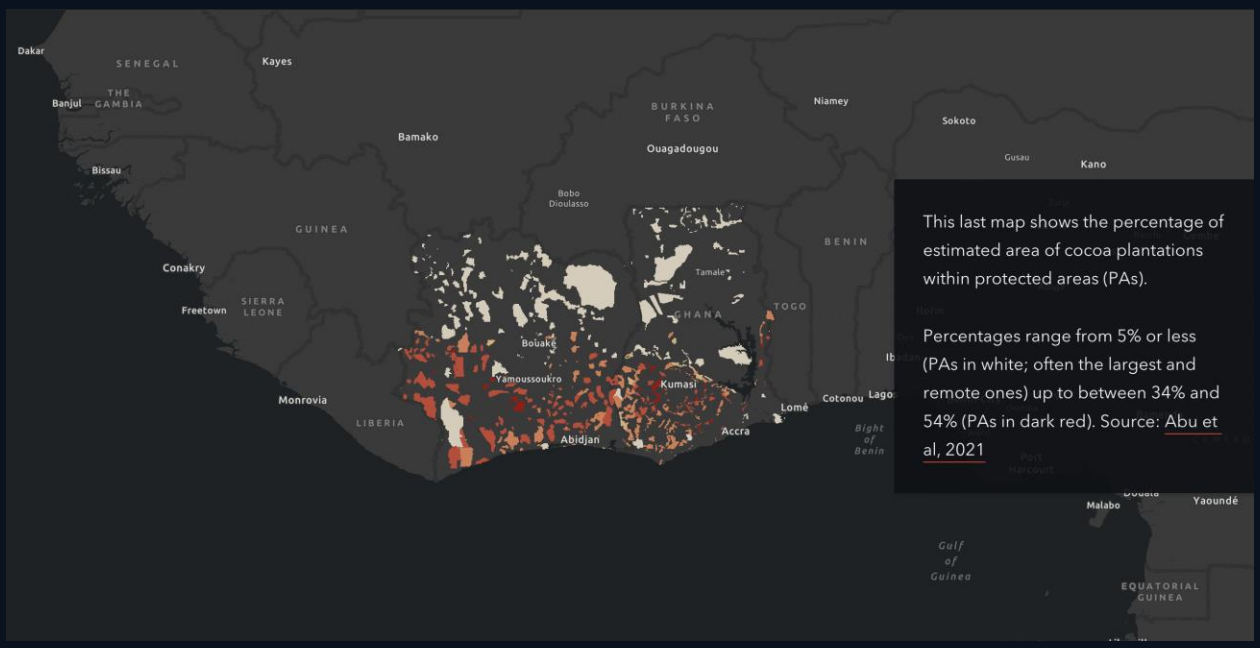


Assessing environmental impacts of a product is complex, especially biodiversity impacts. It is essential to adopt a value chain approach to know where to act and conserve local and global biodiversity. LCA and biodiversity experts from the JRC are collaborating to better include biodiversity in LCA-based methods, using cocoa as a case study.

>>> Read more about research on biodiversity footprint and the biodiversity assessment of value chains .

One typical measure of biodiversity impact is the Potentially Disappeared Fraction of species (PDF*year), i.e. the rate of species lost in a particular area of land (or volume of water) during a time period after land uptake, land use change, emission of toxic substances, etc. Global warming and agricultural land use are the main drivers of biodiversity loss associated to chocolate.

Recent findings on EU food consumption confirm that imported products like chocolate (45 PDF*year), tea (70 PDF*year) and coffee (347 PDF*year) have a significant impact on the loss of species. These values account for the amount consumed by an average EU citizen in one year. They might seem small compared to beef meat (4178 PDF*year) or pork meat (3222 PDF*year). Indeed the loss of species is mainly driven by the consumption of animal-based products (meat, dairy, eggs). But the impact of chocolate is not negligible.



3. Impact of food waste

Food waste can happen at many stages along the food supply chain:

- At primary production, e.g. during cultivation and harvest of cocoa beans.
- During the production process, e.g. at the chocolate factory.
- At retail, e.g. unsold chocolate due to broken package or exceeded expiry date.
- At the household, e.g. chocolate bought but not eaten… for some mysterious reason.

Along the supply chain of chocolate confectionery products and on a 1kg basis, food waste is mainly generated at consumer level (5% of waste generated), followed by factory (2%), retail (0.7%), distribution (0.23%) and transport (0.12%) (Miah et al, 2015).

The impacts of food waste are due to waste treatment (transport, energy) but also to unnecessary (agricultural) production for the wasted amount.

Tackling food waste is crucial to achieve the overall sustainability of food production and consumption. For Europe, environmental impacts of food consumption could be decreased by 7 to 10 % if 50% of food waste was avoided in all phases of the food supply chain (Sinkko et al, 2019). This is surely true – maybe in different proportions – for Africa and the rest of the world.

4. The social & economic aspects

Cocoa production plays an important role in the livelihood and stability of the local communities in terms of jobs and income (Asoh et al, 2014). But it is often associated with low revenues for local farmers since chocolate's profits are strongly skewed towards traders and manufacturers. The chocolate industry is also notorious for labour rights abuses including slave labour and child labour. Coupled with the environmental impacts, these social and economic impacts are crucial to report because they hinder the sustainability of cocoa production.

Social Life Cycle Assessment (S-LCA) is a method that can be used to assess the social aspects of products, considering their actual and potential positive as well as negative impacts along the life cycle. S-LCA can be done quantitatively, semi-quantitatively or qualitatively to complement the environmental LCA results.

The costing part is analysed by the Life-Cycle Costing (LCC): a compilation and assessment of all costs related to a product over its entire life cycle, from production to use, maintenance and disposal. LCC can address the economic impact of a product whose environmental performance is scrutinized in an environmentally focussed LCA (UNEP/SETAC, 2009).

Policy context

Sustainable production and consumption are global challenges. Consumers worldwide must know how goods are produced, even if far away, and pay attention to their environmental footprint. By adopting a value chain perspective, Life Cycle Thinking (LCT) and Life Cycle Assessment (LCA) can support sustainable transitions and decision making.

Assessing the impacts of consumption is crucial to achieve the Sustainable Development Goal on responsible production and consumption (SDG 12). The environmental footprint is also relevant to SDG 14 (Life below water) and SDG 15 (Life on land).

In Europe, EU policies increasingly integrate environment media (such as air, water and soil) and cross-cutting themes like climate, biodiversity, circularity. The

European Green Deal tackles food production (Farm to Fork Strategy) but also pollution (Zero Pollution Action Plan), biodiversity conservation (Biodiversity Strategy for 2030) and circular economy (Circular Economy Action Plan).

>>> Read more on the evolution of Life Cycle Assessment in European policies

In Africa, domestic and international demands for resources keep increasing. Unsustainable production models result in the decline of land and sea derived food products. Shifting to a circular economy and tackling weaknesses of trade regulations is critical for the success of global efforts. In Africa, agriculture is the first more promising sector offering opportunities for circularity. The World Bank estimates the food market to become a trillion-dollar business by 2030, it is an anchor for growth. Agriculture contributes roughly 23% of the continent's total GDP and employs close to 60% of the active population. >>> more info

Now more than ever, value chains are international and cooperation is key to achieve sustainability. A good example is the Sustainable Cocoa Initiative and the EU multi-stakeholder dialogue for Sustainable Cocoa (#CocoaTalks).

Launched in September 2020 by the European Commission (EC), this inclusive dialogue brings together key stakeholders from Côte d'Ivoire and Ghana, the European Parliament and EU Member States, including cocoa growers and civil society. In line with the Green Deal and the EC's zero tolerance on child labour , the main objectives are: eliminate child labour and child trafficking in cocoa supply chains, enhance forests protection and restoration, ensure a living income for cocoa farmers, and complement the two producing countries' initiative on a minimum price for cocoa on the world market.

Find out more on this initiative and the dimensions of sustainability (social, economic, environmental) for Sustainable Cocoa on the Knowledge Centre for Global Food and Nutrition Security .

https://africa-knowledge-platform.ec.europa.eu/

This document has been originated from a StoryMap compiled in the context the European Commission's Africa Knowledge Platform.https://africa-knowledge-platform.ec.europa.eu/

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