

Environmental Footprints of Switzerland: Developments from 2000 to 2018

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Imprint

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The text in this study is partly based on the predecessor study Frischknecht, R., Nathani, C., Alig, M., Stolz, P., Tschümperlin, L., Hell-müller, P. (2019): Umwelt-Fussabdrücke der Schweiz: Zeitlicher Verlauf 1996–2015.

Summary

Aim of the study and methodological approach

The aim of this study was to calculate a time series of selected environmental footprints for Switzerland, taking into account the entire supply chain. In addition, the environmental impacts were broken down into the most important demand categories.

The development of the footprints was compared with current findings on existing carrying capacity limits and environmental targets for Switzerland in order to highlight the need for action from a footprint perspective.

The environmental footprints were calculated using the so-called IO-TRAIL method. This involved linking an environmentally oriented input-output model for Switzerland with a life cycle assessment of the imported products.

System boundaries

The environmental impact caused by Switzerland can be viewed from two complementary perspectives that provide answers to different questions:

- In the so-called **domestic perspective**, the focus is on the domestic environmental impact caused by companies and households.
- The **footprint perspective**, on the other hand, is based on the demand for final products in Switzerland. It attributes to Switzerland the global environmental impacts caused by its final demand. The entire life cycle of the final products is included. This perspective, also referred to as the consumer perspective, is the focus of this report.

To put it simply, the domestic perspective thus looks at environmental impacts from the supply side, while the footprint perspective starts from the demand side. This leads to different values, because production often takes place in cross-industry and cross-national value chains. In addition, there are environmental impacts from the use and disposal of the products. In the footprint perspective, Switzerland's environmental impact is significantly higher than in the domestic perspective.

Footprint indicators

The development of Switzerland's environmental footprint was calculated for various environmental indicators,

- the total environmental impact according to the eco-point method¹ (hereinafter also referred to as total environmental footprint), which summarises a broad spectrum of environmental impacts in one key figure, and according to ReCiPe as an alternative fully aggregating assessment method,
- the greenhouse gas footprint with the IO-TRAIL method as a sensitivity calculation in comparison to the calculation of the Swiss Federal Statistical Office by means of environmentally extended input-output analysis,
- the biodiversity loss caused by land use (species loss potential),

1 The method is also called the ecological scarcity method.

- marine eutrophication, which measures the nitrogen load in the oceans and
- the water stress. This captures global water consumption, taking into account the prevailing water scarcity in the production regions.

Development of the total environmental footprint

Figure 1 shows the development of the total global environmental impact per capita associated with Swiss final demand. It has decreased from 35.1 to 25.8 million eco-points between 2000 and 2018. This corresponds to a decrease of 26 %. The footprint is well above the environmental carrying capacity limit (see below). The figure also shows that the environmental impact is predominantly generated abroad: in 2018, the foreign share was 68 %. The domestic share accounted for 32 % of the environmental impact. The foreign share has increased since 2000: in that year it was only 61 %. The reason for this is that the domestic environmental impacts have been reduced more than those abroad.

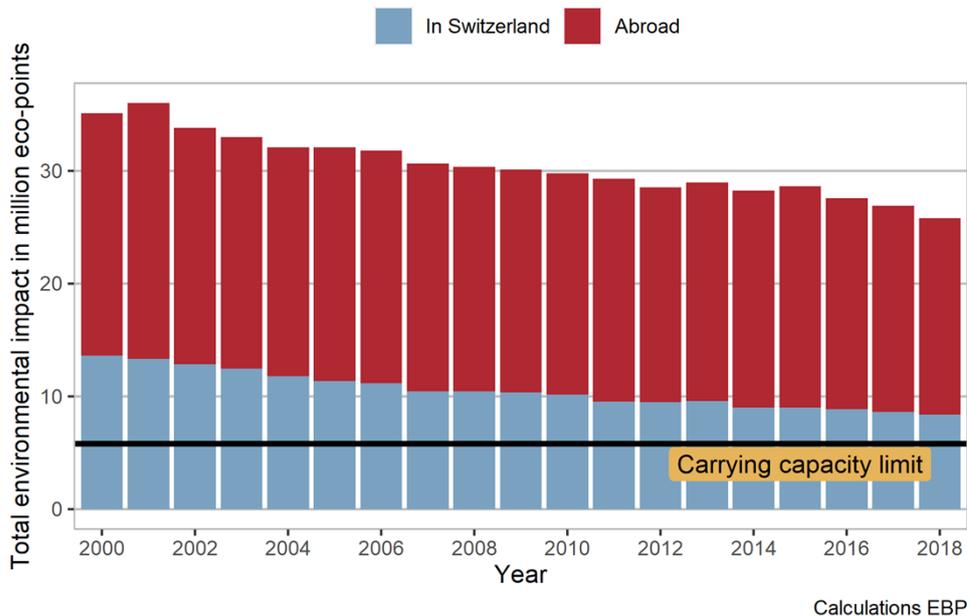


Figure 1 Development of the total environmental footprint per person, divided into the impact generated domestically and abroad, 2000 - 2018

Shares of final demand categories in the total environmental footprint

Figure 2 shows the shares of the individual final demand categories in the total environmental footprint. Final demand categories are to be understood as bundles of goods and services. Housing and food each account for around 25 % of the total footprint. In this chart, the housing category also includes housing construction and "furniture and household appliances". Private mobility comes third with a 14% share of environmental impacts. This value is to be understood without the environmental impacts associated with package tours, which are statistically recorded in the final demand category of "leisure and entertainment".

The two final demand sectors "health care" and "leisure and entertainment" have a share of 6% and 5% respectively. This is followed by clothing and "education and communication" with shares of 3% each. The government consumption, i.e. that which does not clearly serve private households, is responsible for 6% of the environmental impact.

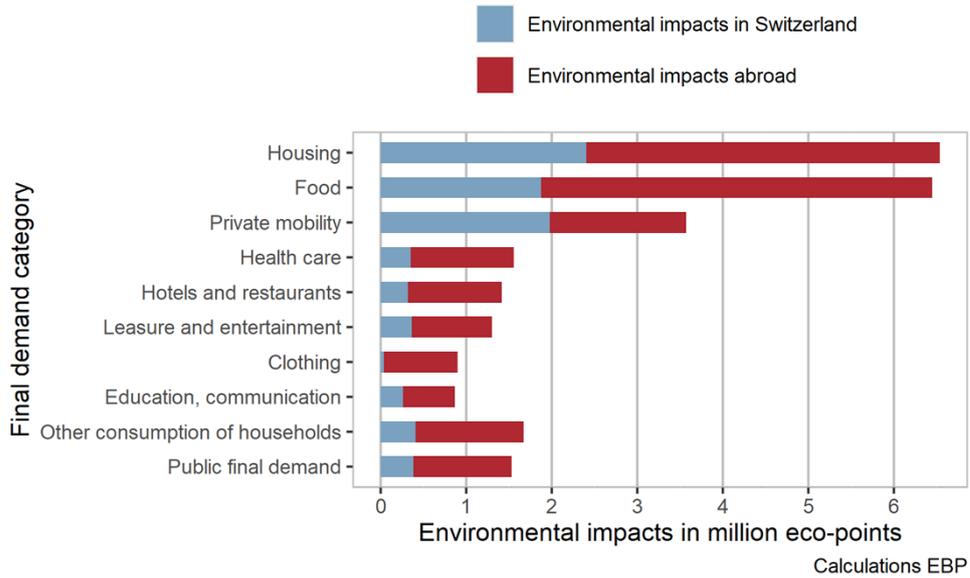


Figure 2 Total environmental footprint per person by final demand category, 2018

The figure also shows how the environmental impacts associated with the final demand areas are distributed between Switzerland and abroad. The environmental impacts triggered abroad have a high, in most cases dominant, significance for all final demand categories.

Development of the biodiversity footprint

The biodiversity footprint quantifies the potential, long-term, global species loss due to land use (e.g. from agriculture or settlements) compared to an untouched, natural reference state. It is the only footprint calculated in this study that increases per capita between 2000 and 2018, by 8 % (Figure 3). The increase is due to an increase abroad that more than compensates for the decrease at home. The foreign share of the biodiversity footprint rises accordingly from 58 % in 2000 to 70 % in 2018.

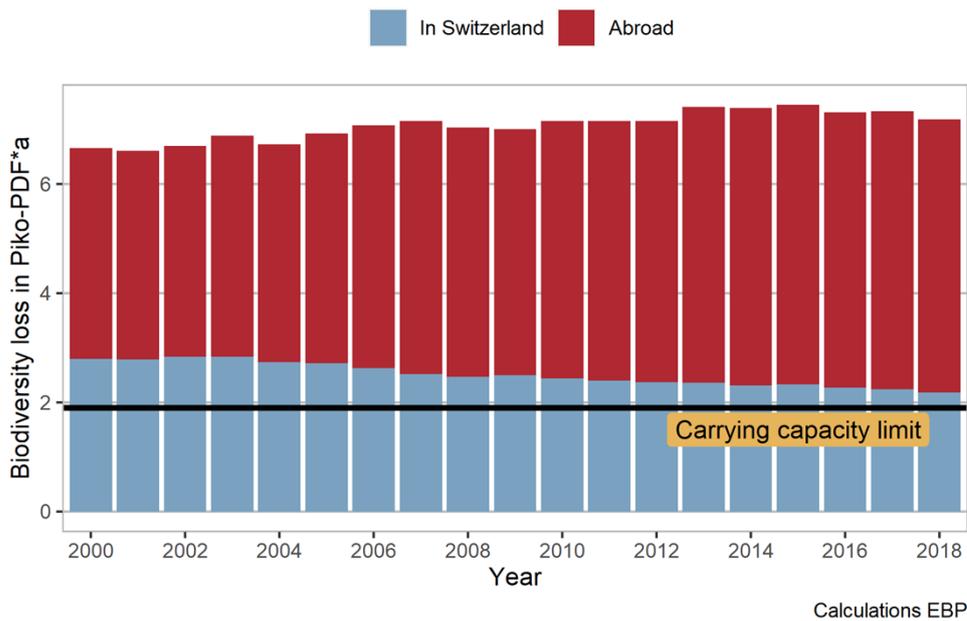


Figure 3 Development of the biodiversity footprint per person, divided into the impact generated domestically and abroad, 2000 - 2018

Supplementary analyses

Selected areas were analysed in addition.

- **Flight-related greenhouse gas emissions:** Passenger flights have a high environmental relevance. They contribute around one fifth of Switzerland's greenhouse gas footprint. Due to their additional impact on the climate in the stratosphere, flight emissions are included in the calculation with a factor of 3, according to the most recent recommendation of the Swiss Academy of Sciences scnat. Air transport of imported goods is only of minor importance compared to passenger flights. Overall, the share of air transport in Switzerland's greenhouse gas footprint is only 1%. However, air transport accounts for 21% of greenhouse gas emissions associated with the transport of goods, although only 0.2% of all imported goods are transported by air.
- **Precious metals** (especially gold, silver, platinum and palladium): In Switzerland, they are mainly used as a store of value, but are also processed industrially to some extent. However, the extent to which they are industrially processed is not known. Their use as a store of value leads to very strong fluctuations in imports and exports. As they are also very environmentally intensive, they are not included in the environmental footprint results presented above. In individual years, the environmental impacts associated with the use of precious metals reach a similar magnitude as Switzerland's overall environmental footprint. Since the year 2000, imports have mostly exceeded exports, so that a stockpiling of precious metals has probably taken place in Switzerland, even taking into account industrial use.

Need for action

Based on the planet's carrying capacity limits, we recommend a reduction of the biodiversity footprint by 74% and of the eutrophication footprint by 48% (Figure 4). Based on existing domestic targets (long-term Climate Strategy 2050 and Sustainable Development Strategy 2030), we recommend at least an 89% reduction of the greenhouse gas footprint by 2040.

For the total environmental footprint, we estimate a reduction requirement of 67 %, based on Switzerland's environmental targets and legal limits.

Until these reductions are achieved, the impacts and costs of environmental pollution will be shifted into the future and at the expense of the global population.

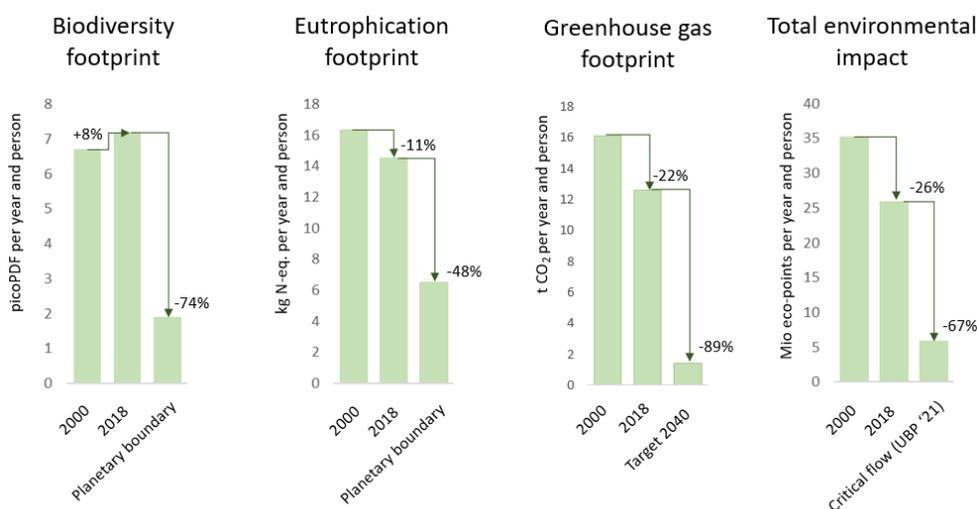


Figure 4 Development of environmental footprints per person between 2000 and 2018 and the further need for reduction

Conclusion and outlook

Switzerland's environmental footprints, i.e. the global environmental impacts associated with final demand, are significantly higher than the domestic environmental impacts. This means that Switzerland causes more environmental impacts abroad with its final demand than foreign countries trigger environmental impacts in Switzerland with their final demand. In order to meet its final demand, Switzerland therefore shifts environmental impacts abroad.

On a positive note, the environmental impacts per person are decreasing for most of the environmental indicators examined here (exception: biodiversity footprint). However, the level of environmental impacts is still significantly above the ecological carrying capacity or the target values of Swiss environmental policy, so that additional efforts are required. All actors (households, companies, administration) can contribute to this with their consumption, production and procurement behaviour. Whether the corresponding potentials are realised depends not least on social developments and suitable governmental framework conditions to strengthen the circular economy, resource conservation and responsibility along the supply chains.

The present model calculations can only depict the real complexity of global supply chains with simplifying assumptions. Future methodological improvements are possible, among other things, in the sector resolution of the input-output model used and by expanding the database for the life cycle assessment of imported goods.