Case study #1 : DevOps engineer – biodiversity footprint tool (GBS)

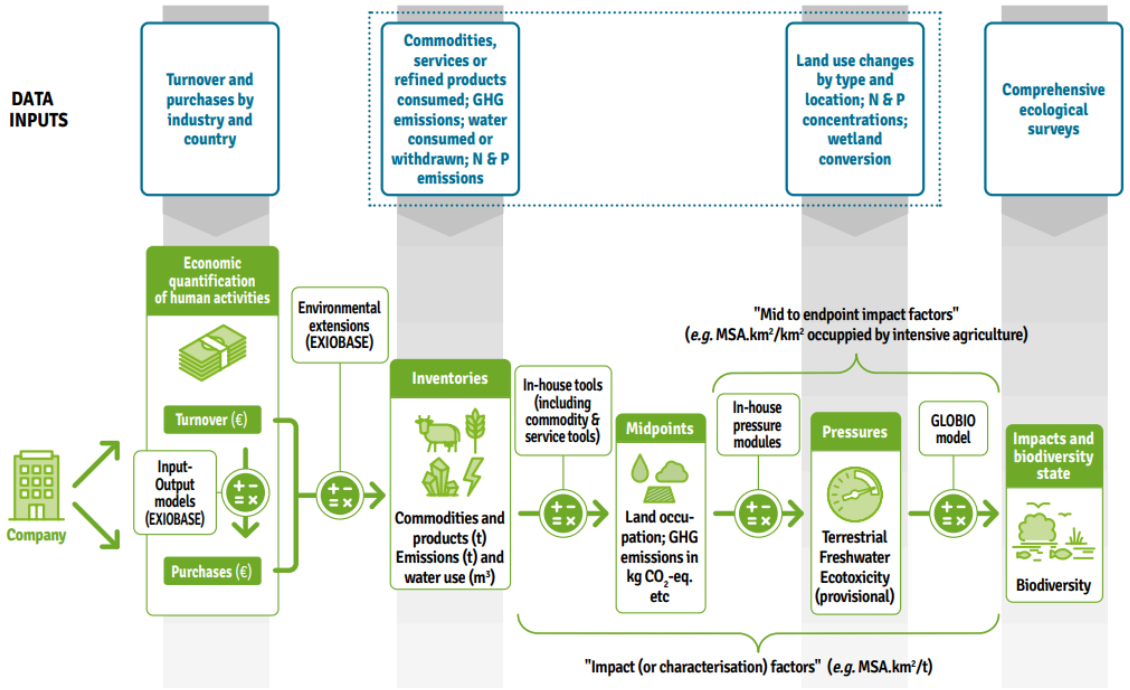
Context

CDC Biodiversité is a subsidiary of the Caisse des Dépôts et Consignation, the largest French financial institution. It is specialized in providing biodiversity-positive solutions to businesses such as ecological offsets and biodiversity footprinting. The **Global Biodiversity Score®** (GBS®) is a tool developed by CDC Biodiversité to measure **corporate and investments' biodiversity impacts**[1].

The tool is used by an ecosystem of companies, financial institutions, consultants and academics.

[1] More information can be found at https://www.mission-economie-biodiversite.com/wp-content/uploads/2022/01/N18-TRAVAUX-DU-CLUB-B4B-GBS-UK-MD-WEB.pdf and http://www.mission-economie-biodiversite.com/wp-content/uploads/2020/09/N15-TRAVAUX-DU-CLUB-B4B-GBS-UK-MD-WEB.pdf

In short, the GBS follows a hybrid approach to assess the footprint of economic activities. There are four main data entry points, which can also be calculation stages, in the GBS. The first stage is (i) financial data (economic quantification of human activities) which can be used to estimate (ii) raw material consumption, emissions and water use (inventories). In turn, it allows to assess (iii) pressures on biodiversity. Through pressure-impact relationships, (iv) impacts on biodiversity state can be assessed. The GBS uses the best data available at each calculation step, in what can be called a stepwise approach. In the absence of data, a financial default approach evaluates companies based on turnover figures and regional industry averages. Fed with more specific data, the assessment is refined to take into account company-specific pressures. The following figure describes the possible data inputs in the GBS.



Possible data inputs and connections with the GBS modules

Biodiversity impact of crops

Goal

The GBS can assess biodiversity of various commodities such as agricultural crops. The biodiversity impact results are expressed in MSA.km² (mean species abundance times km²) and could be detailed by pressure on such as land use or climate change.

The goal of this exercise is to compute the total static biodiversity loss due to land use caused by wheat in every country (in MSA.km²) in 2019.

Provided material

- Crop production dataset: https://www.fao.org/faostat/en/#data/QCL

- GBS crop production impact factors (in MSA.km²/t): “crops.csv”
- Countries correspondence table: “country_specs.xlsx”

Expected output format

You can present your code and eventual computation choices in an .Rmd or Jupyter notebook that can be easily executed from an external environment.
The results can be presented in a table, and any dataviz proposal (graphs and maps) and additional testing will be highly valued.
Also, sharing your work through an R package and a GitHub repository will be highly valued.