# Institutional biodiversity footprinting:
# Draft guidance for Nature Positive Universities

December 2025

# What is an institutional biodiversity footprint? FAQs

NATURE POSITIVE UNIVERSITIES

## What is a biodiversity baseline?

A biodiversity baseline is a snapshot in time to facilitate measurable improvements for biodiversity at your institution. This can be undertaken at two levels:

- **Campus biodiversity survey:** records the biodiversity present on site
- **Biodiversity footprint:** more comprehensive and measures direct and indirect biodiversity impacts of your activities

## What is a biodiversity footprint?

A biodiversity footprint is a comprehensive estimate of the impacts to biodiversity caused by human activities, such as an individual, product or institution. Similar to a **carbon footprint**, this is calculated by collecting activity data, such as purchasing records of equipment or building materials, flights taken, food consumed, which are converted into environmental pressures then into a measure of indirect biodiversity impacts. These impacts may take place in the location where the university is based or overseas where products and services are imported from or manufactured.

## What can this kind of analysis tell us?

A biodiversity footprint can tell us how our activities and the products and services we use impact the environment, such as **land use** required to grow resources, **water use**, and pollution impacts such as **greenhouse gas emissions**, **eutrophication** and **acidification**. By knowing which activities have the largest impacts, and finding where these impacts are located, we can focus our efforts, set targets and create action plans to avoid and reduce harm to species and ecosystems, and then work to mitigate and compensate for residual impacts on nature.

## What kind of data is required?

**Activity data** includes records of all the products and services that are used during the course of our activities at a university. Questions like what have we bought? from where and how much? These include things like energy use, paper, IT and lab equipment, food, construction materials as well as flights and land used by our buildings and facilities. Much of this data might already be collected if your university has started carbon accounting to reduce its climate impacts and is typically available in the form of financial data or spend by category.

## How to find this data at my institution?

Data can be gathered by accessing **procurement** accounts and financial records, and speaking to account holders for the different suppliers used by the university. A good first step would be mapping data availability, key people responsible for the data, and identifying a working group to take forward this work. Where there are gaps, conducting surveys can help to provide estimates, for example for student travel or food consumption.

## What tools or resources do we need?

Collecting activity data for your institution can be time consuming, however you could start with a smaller area of your operations. Calculating life cycle and biodiversity impacts is complicated and involves the use of specialist software. A number of universities in the NPU network have also conducted their own footprint studies on different areas of their operations. References and links to relevant studies and software are included at the end of this document.

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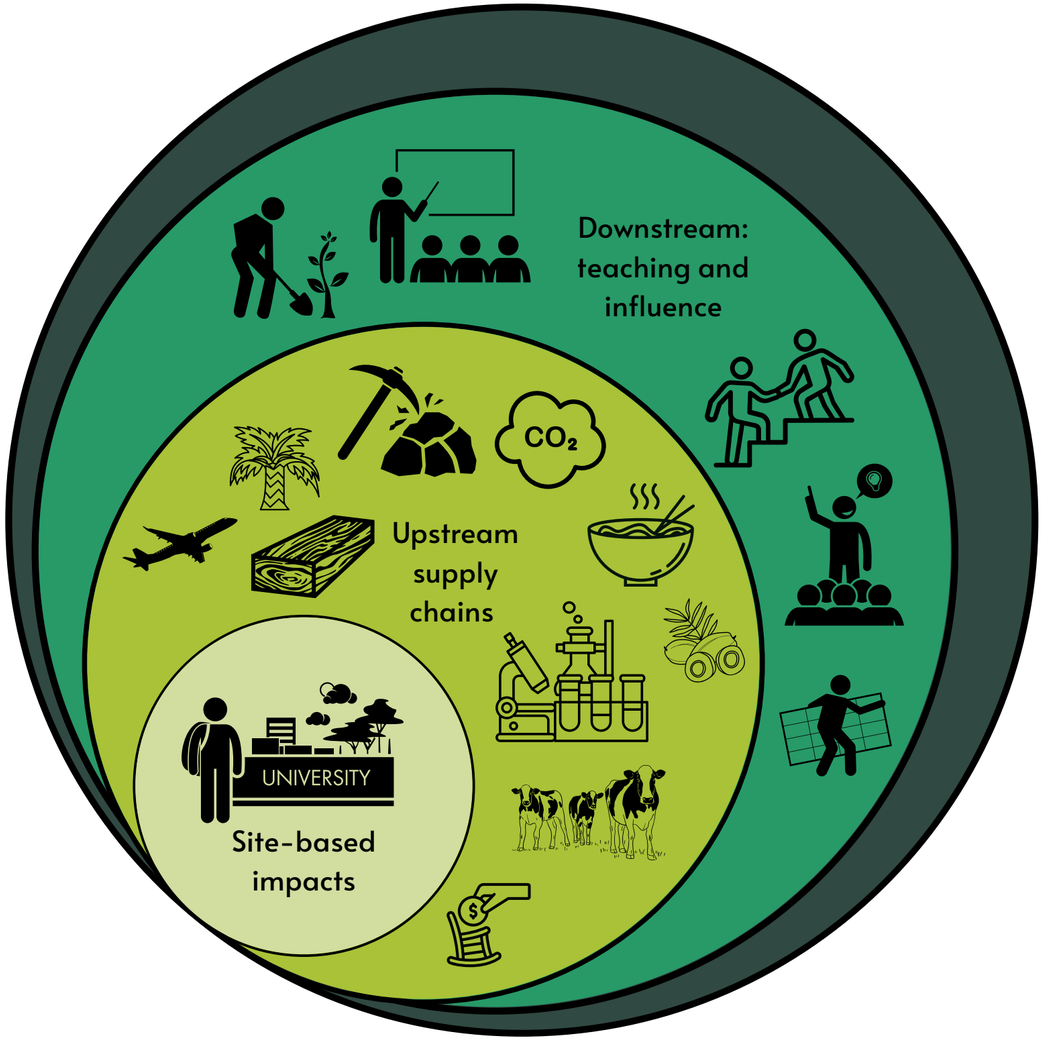
# What are a university's impacts on nature?




***Biodiversity impacts of a university**: from site-based impacts such as grounds management and construction, to upstream impacts related to supply chains of products and services used by the university, to downstream impacts of research, teaching and community outreach.*

**Site-based impacts**

These include impacts to existing biodiversity present on site, related to grounds and facilities management, such as land, fuel and water use, loss of habitat for new construction projects or biodiversity uplift activities such as new habitat creation.

**Upstream supply chains**

These are generally much larger than site based impacts and relate to products and services used by universities and their indirect impacts in supply chains, such as mining and transport of materials in IT products or lab equipment, crop, forest and grazing lands associated with food and resource production, air, water and soils pollution associated with products used, and impacts of banking, pensions and investments made by universities.

**Downstream: teaching and influence**

Downstream impacts are related to a university's research and outreach activities, teaching and the future careers and lifestyles of its students. These activities were out of scope for the University of Oxford's biodiversity footprint, and would require development of additional methodology to assess.

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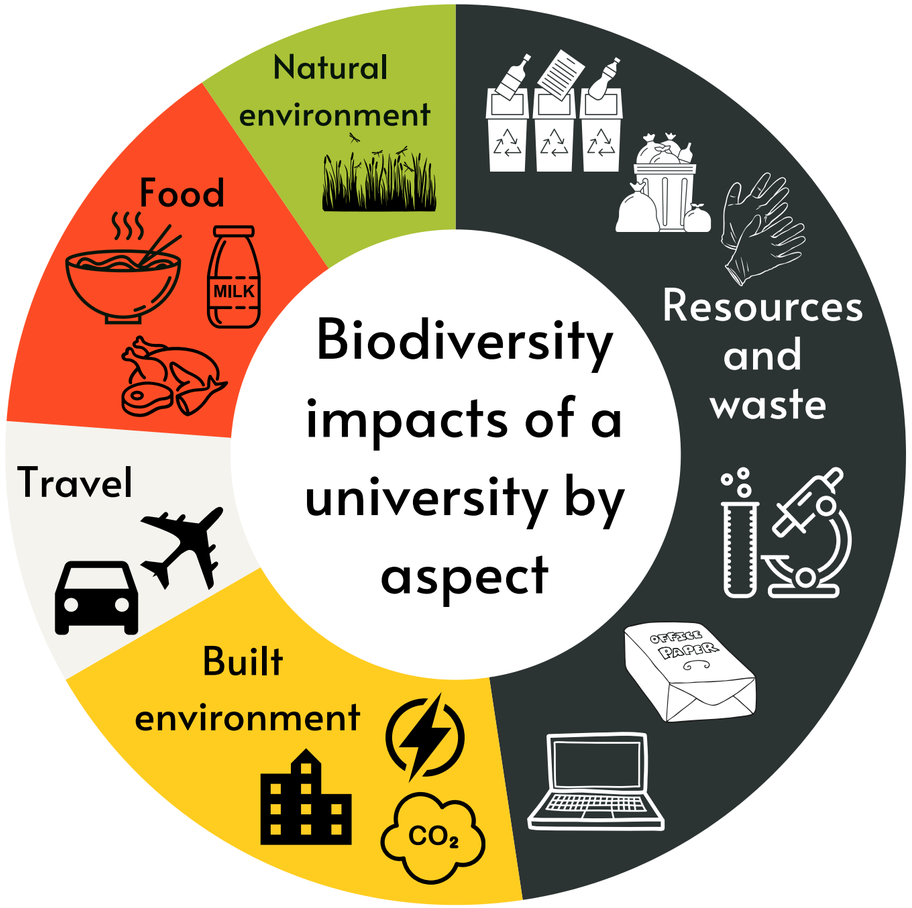
# University of Oxford's biodiversity footprint




*Infographic representing the aspects of University of Oxford's biodiversity footprint, as documented in Bull, J.W., et al. Analysis: the biodiversity footprint of the University of Oxford. Nature 604, 420-424 (2022) https://doi.org/10.1038/d41586-022-01034-1*

**Natural environment**

These include impacts to existing biodiversity present on site, grounds and facilities management relating to green spaces, including loss of habitat for new construction projects or biodiversity uplift activities such as creation of new habitats or nature areas.

**Built environment**

These include fuel, electricity and water use in university-owned and managed buildings and mining and transport of resources involved in construction and infrastructure.

**Food**

These include impacts related to growing and transporting all food consumed on site, eg in university canteens, cafeterias and departmental catering and conferences.

**Travel**

These include impacts related to staff and student travel including commuting between home and work, conference and business travel.

**Resources and waste**

These include impacts related to procurement of goods and services used in all university activities, such as IT equipment, server space, paper, laboratory equipment and supplies and furniture, at all stages from production to disposal.

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# Biodiversity footprint process:

1

Choose the scope

Decide which parts of your operations will you look at. What is your capacity for data collection and analysis? Which activities are under direct or indirect control? Which activities can the university influence?

2

Collect the data

Map available data. Which activities is data available for? Who holds the data? If there are gaps, how could these be resolved? Is the data in the right format? What additional information are your suppliers able to provide? (eg. location data)

You might choose to collect data for the following categories, which reflect categories used in University of Oxford's analysis. Or other categories may make more sense for your institution. NB: this list is not exhaustive, and excludes categories such as banking, investments, student residences* and downstream impacts of research and teaching:

| Data Category | Description |
|---|---|
| Built Environment | *Utilities, fuel, and electricity use in owned or managed buildings + any spend on construction and infrastructure.* |
| Natural Environment | *Land owned and managed + any spend on management.* |
| Travel | *Any employee commuting for business activities and between home and work.* |
| Food | *All food consumed on premises at work e.g. in cafeterias and for catered events.* |
| Resource Use & Waste | *Procurement and disposal of goods and services from supply through to disposal* |
| Digital Activities | *Supply of online services / streaming* |

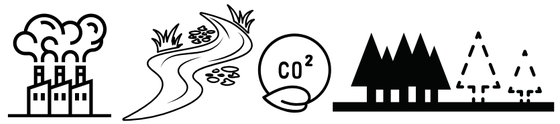
A spreadsheet detailing the data and units used by University of Oxford is available here.

**Project:** Biodiversity Impacts Data Template
**Description:** This spreadsheet details the input activity data and associated units used in the paper by Bull, et al (2022). https://www.nature.com/articles/d41586-022-01034-1

*Student residences were excluded due to the structure of University of Oxford and its constituent colleges which are not under university control

# Biodiversity footprint process (cont.):

3



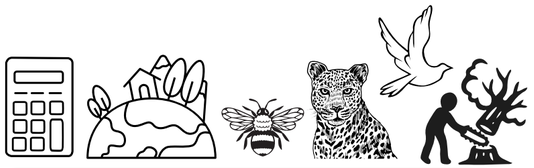

Calculate environmental impacts

These are quantitative measures of the negative life cycle impacts of activity data, also known as environmental pressures, such as:

- Greenhouse gas emissions (kg CO2e)
- Land use (m2)
- Water use (litres)
- Water pollution and eutrophication (kg PO4e)
- Air pollution and acidification (kg SO2e)

These impacts can be calculated using life cycle analysis (LCA) software*. Having location data for products from suppliers allows significantly better estimates of environmental impacts, and the opportunity to mitigate and compensate in the locations where the impacts take place.

4

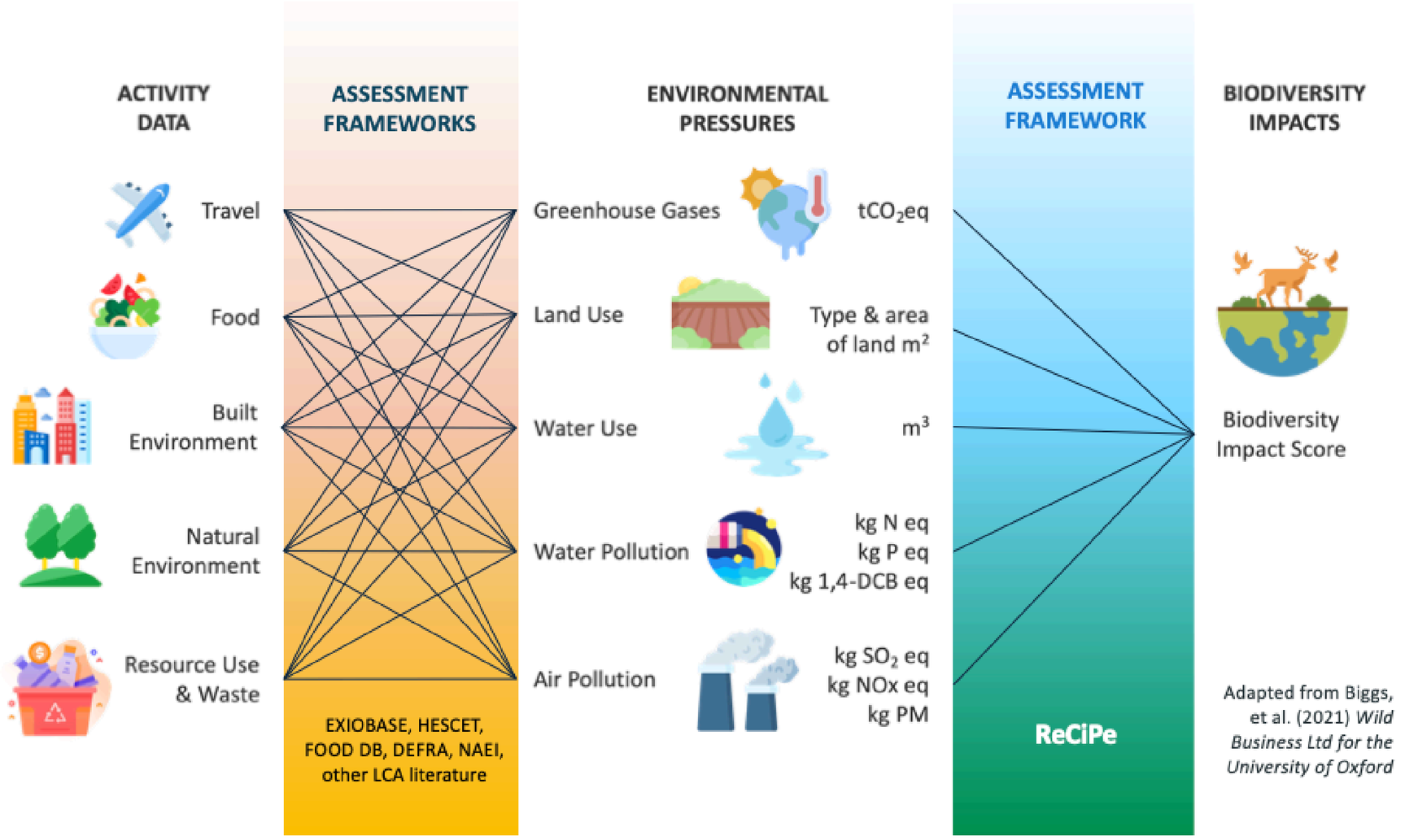


Calculate biodiversity impact

Life cycle impacts can then be converted into a proxy biodiversity measure using specialist software*, which calculate relative impacts of the different activities in units such as species.year or PDF which calculate local risk of species extinction caused by a given activity.

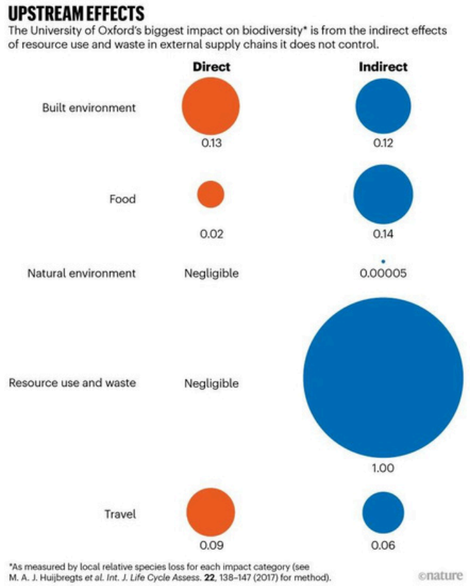
*Software used to conduct analyses by universities in the NPU network linked at the end of this document

# Biodiversity footprint process (cont.):

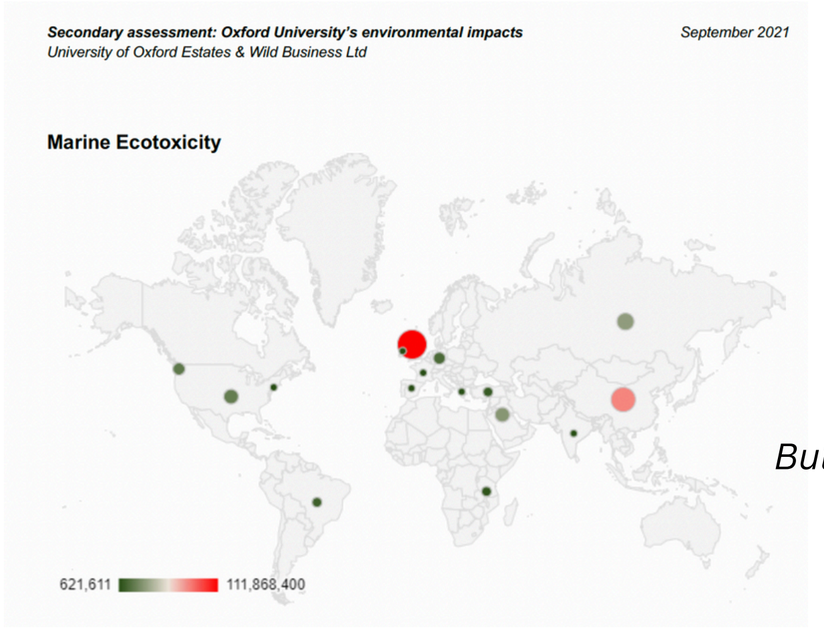



Adapted from Biggs, et al. (2021) *Wild Business Ltd for the University of Oxford*

# Case study: University of Oxford, UK



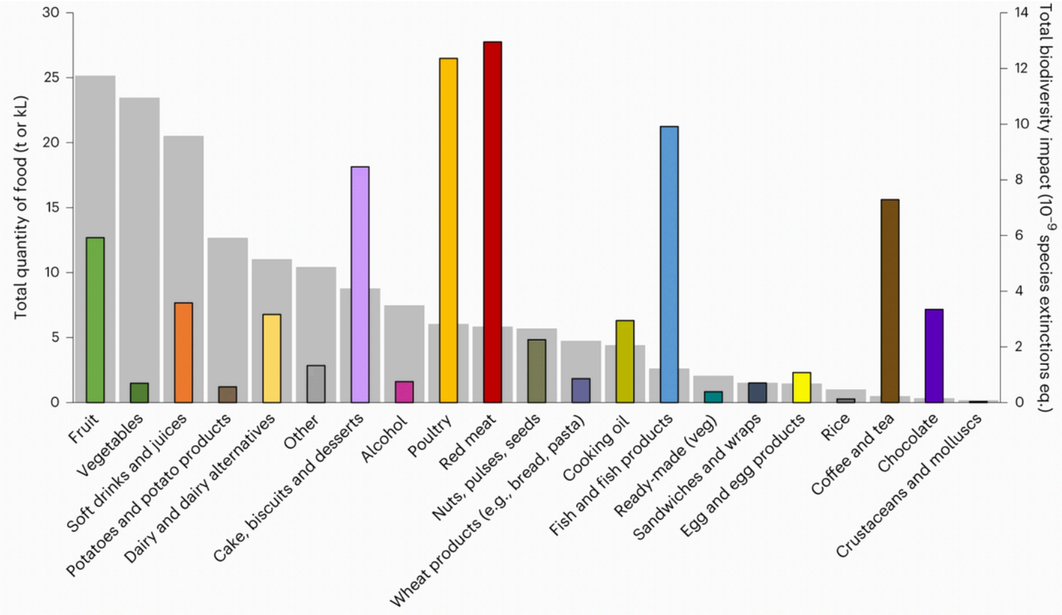

Analysis of the impacts of University of Oxford's activities highlighted the large indirect impacts of resource use and waste compared to other aspects, such as travel, food or the built environment. Although out of direct control of the University, these impacts are important to address, and can be influenced by procurement decisions and policies, which are in the university's direct control.




Analysis of the spatial life cycle impacts of University of Oxford's activities revealed hotspots for impacts on ecosystems, such as this map which represents marine ecotoxicity impacts, which are largest in the UK, followed by China.

*Bull, J.W., et al. Analysis: the biodiversity footprint of the University of Oxford. Nature 604, 420-424 (2022) https://doi.org/10.1038/d41586-022-01034-1*

# Case Study: Lady Margaret Hall, University of Oxford, UK




A recent study focusing on food impacts at Lady Margaret Hall, a college of University of Oxford, found that the highest impacts to biodiversity were associated with categories such as red meat, poultry and fish, followed by coffee, tea and chocolate. This analysis helps highlight possible interventions and policy changes to reduce an institution's biodiversity footprint.

*Taylor, I., Bull, J.W., Ashton, B. et al. Nature-positive goals for an organization's food consumption. Nat Food 4, 96–108 (2023). https://doi.org/10.1038/s43016-022-00660-2*

# Case Study: University of Jyvaskyla, Finland

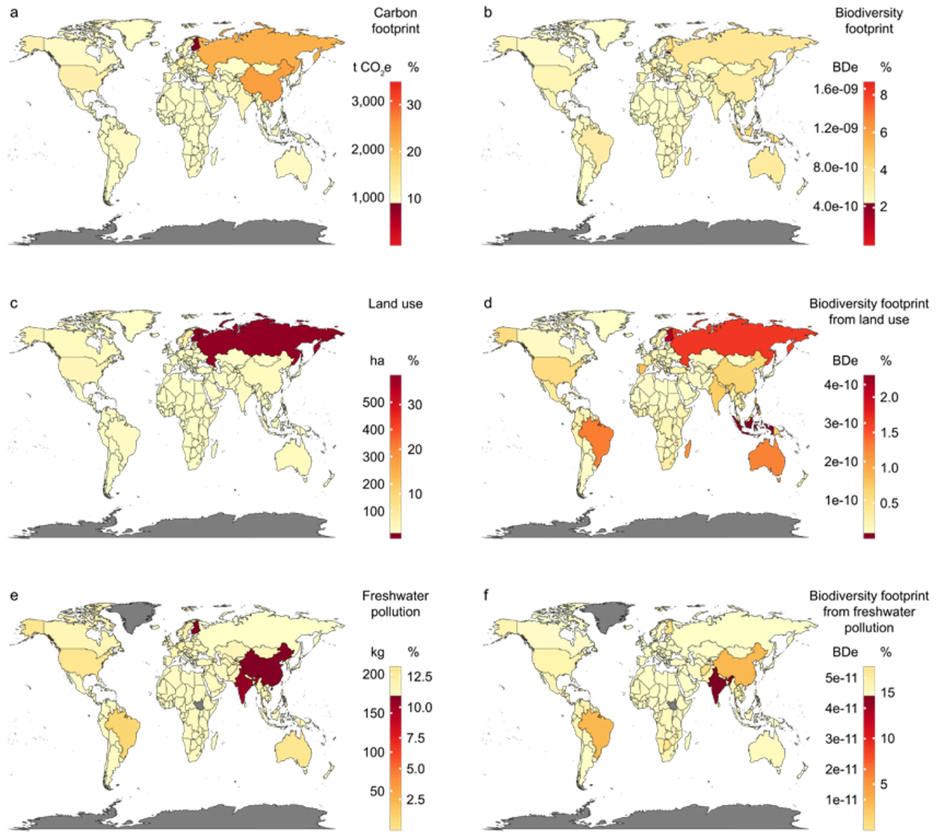



**Fig. 3 | Geographical analysis of the carbon and biodiversity footprints of the University.**

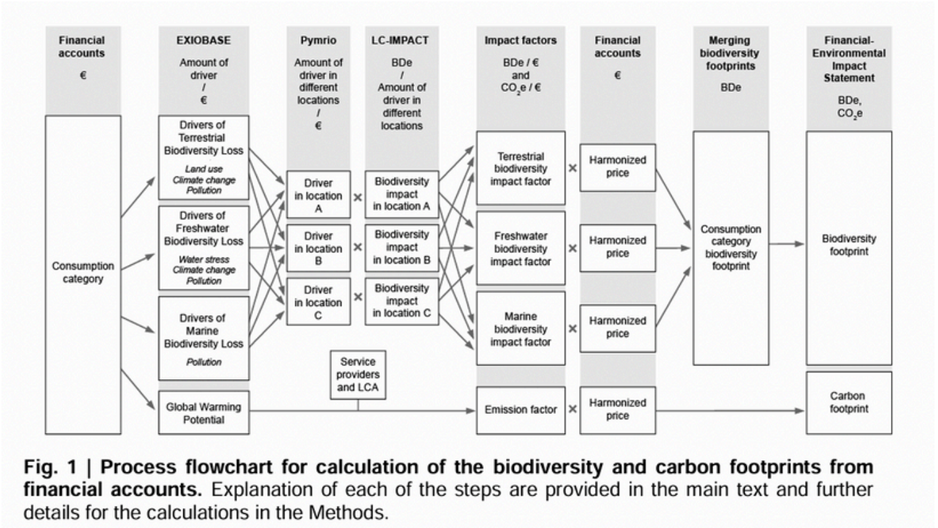
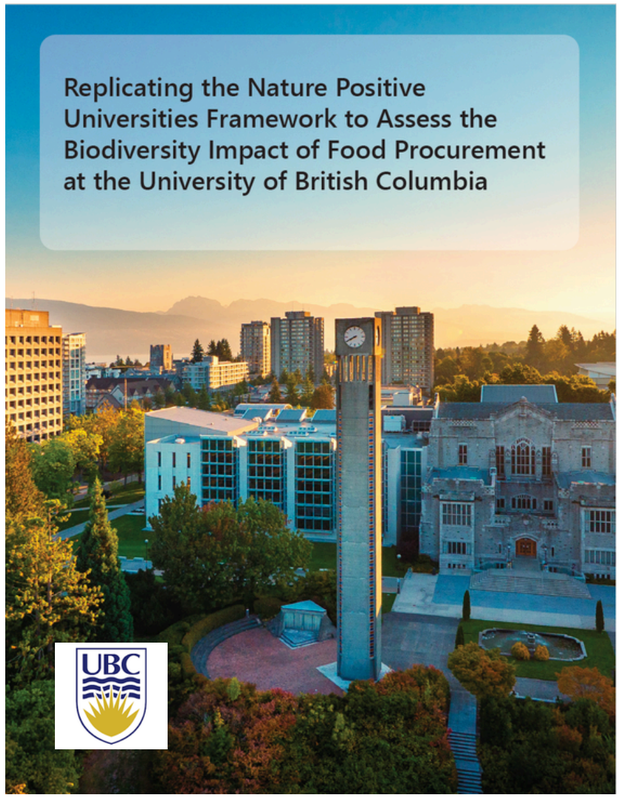



**Fig. 1 | Process flowchart for calculation of the biodiversity and carbon footprints from financial accounts.** Explanation of each of the steps are provided in the main text and further details for the calculations in the Methods.

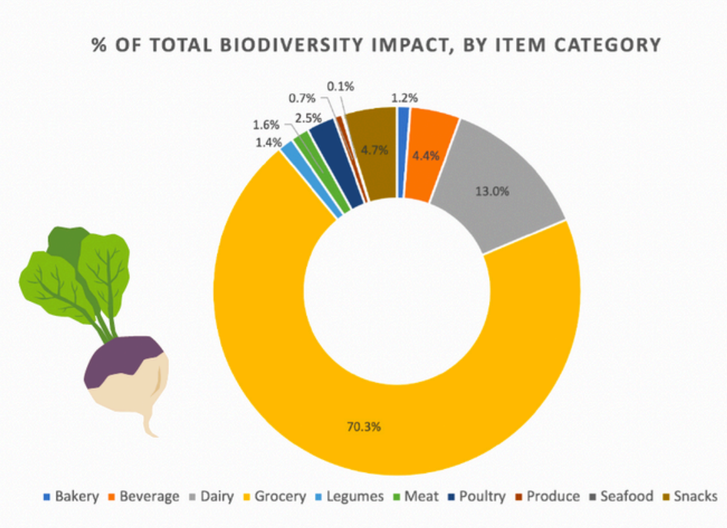
University of Jyväskylä have developed a spatially explicit approach to determine the geographical location of their carbon and biodiversity footprints. In terms of the carbon footprint, the largest share of emissions was generated in Finland, Russia and China, and the largest threats to biodiversity were observed in Estonia, United Arab Emirates, Palestinian Territory, Italy, Indonesia, Finland, and in several small island states (e.g. Guam and Seychelles). It was notable that 66 % of the carbon footprint and 98 % of biodiversity footprint is situated outside of Finland.

https://arxiv.org/ftp/arxiv/papers/2309/2309.14186.pdf

# Case Study: University of British Columbia, Canada




Research students at UBC assessed the environmental impacts of their food procurement using Oxford's conceptual framework, looking specifically at the GHG emissions, land and water use, air and water pollution of food procured by UBC Food Services (UBCFS) outlets (including dining halls, restaurants, retail and catering) between January and December 2022. They used the impacts to estimate the extent of biodiversity loss associated with food procurement and identify areas for reduction of negative impacts.




## RESULTS

- UBC procured the most grocery and beverage products by weight
- Grocery and dairy categories had the highest mid-point and biodiversity impacts
- Meat, poultry and dairy had the highest per-kilo impacts

*Final report available here:*
*https://www.naturepositiveuniversities.net/wp-content/uploads/2024/04/NPU_UBC_FinalReport.pdf*

# Biodiversity footprinting references:


- Bull, J.W., et al. Analysis: the biodiversity footprint of the University of Oxford. Nature 604, 420-424 (2022) https://doi.org/10.1038/d41586-022-01034-1
- Biodiversity Impacts Data Template: https://www.naturepositiveuniversities.net/wp-content/uploads/2024/04/Biodiversity-Impacts-Data-Template.xlsx
- Taylor, I., Bull, J.W., Ashton, B. et al. Nature-positive goals for an organization's food consumption. Nat Food 4, 96–108 (2023). https://doi.org/10.1038/s43016-022-00660-2
- Geneidi, S. et al 2024. Value-transforming financial, carbon and biodiversity footprint accounting https://arxiv.org/ftp/arxiv/papers/2309/2309.14186.pdf
- University of Jyvaskyla's biodiversity footprint (in Finnish): Sustainability for JYU: Jyväskylän yliopiston ilmasto- ja luontohaitat 2020 http://urn.fi/URN:ISBN:978-951-39-8988-0
- Utrecht University (Netherlands) recent biodiversity footprint https://www.uu.nl/en/news/utrecht-university-is-the-first-in-the-netherlands-to-measure-its-biodiversity-footprint
- From local species monitoring to global value chain impacts: A starting point for assessing biodiversity impacts of higher education institutions (including University of Hohenheim case study) https://www.sciencedirect.com/science/article/pii/S0006320725006500
- The Guardian Newspaper Biodiversity Footprint What impact does the Guardian have on the natural world? | Carbon footprints | The Guardian
- The City of Tampere, Finland Carbon and Biodiversity Footprint of the City of Tampere
- SITRA. 2024. We can now measure biodiversity footprints, here's how. https://www.sitra.fi/en/articles/we-can-now-measure-biodiversity-footprints-heres-how/
- UBC Food impacts report https://www.naturepositiveuniversities.net/wp-content/uploads/2024/04/NPU_UBC_FinalReport.pdf

# Biodiversity footprinting software and tools:

- EU STEPS https://eusteps.footprintcalculator.org/
- Exiobase https://www.exiobase.eu/
- Open Food Facts https://world.openfoodfacts.org/
- LC Impact https://lc-impact.eu/
- ReCiPe https://www.rivm.nl/en/life-cycle-assessment-lca/recipe
- Bioscope https://bioscope.info/
- MiLCA software https://www.milca-milca.net/
- IDEA inventory https://riss.aist.go.jp/en-idealab/idea/assessment/