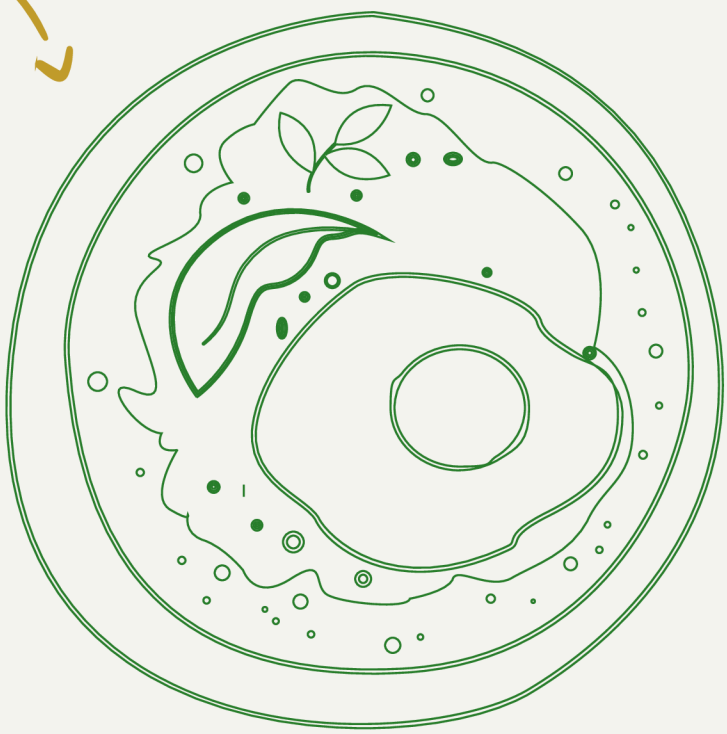
Colocaviz

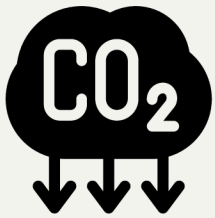
A Pocket Guide to Mindful Eating

John Taylor, Ariane Augustoni, Louis Litzler-Italia



Introduction

What we eat doesn't just affect our health, it also has a huge impact on the planet. Food production is responsible for around a third of global greenhouse gas emissions, and over 70% of all freshwater use goes into growing crops and raising animals. Some foods, like beef, can produce up to 100 kg of CO2 per kilogram of meat, while others, like lentils or potatoes, have a footprint that's many times smaller.



Yet the impact of food extends beyond carbon and water footprints. Ethical concerns are deeply embedded in how and where food is produced. Every year, over 80 billion animals are slaughtered globally to meet demand, often raised in high-intensity systems with questionable welfare standards. At the same time, the vast areas of land required for crops – especially feed for livestock – raise further concerns about biodiversity loss, deforestation, and land usage, with nearly 50% of the world's habitable land already used for food production.

The choices we make about what to eat are inseparably linked to how we use land and how we treat animals within the global food system. They are also a non-negligible part in our total water and carbon footprints.

This project aims to make these connections visible. Using 2 datasets covering carbon and water footprints per kg of food and information about food production, yield, area harvested, and animal slaughter by country and year, we've created a series of data visualizations that explore the true cost of our food. The goal is not to dictate dietary choices, but to inform them, by providing a clearer view of how what we eat affects the planet, its resources, and the lives it supports.

Datasets

This project uses two main datasets. The first compiles average carbon (kg CO_2eq/kg) and water (L/kg) footprints for hundreds of food items, based on a wide range of published studies, and categorizes them by food typology. The second one contains global data on food production, yield, harvested area, and number of animals slaughtered, by country and year, from 1961 onward. We also considered a third dataset focused on social sustainability indicators, but due to access limitations and added complexity, we chose to concentrate on environmental impacts for this project.

Brainstorming

Once we had selected our datasets, we sat down to decide how best to use them. Given the range of available data, we could have focused on countries, specific food items, animal categories, production volumes, and more. But we wanted our visualizations to be as impactful and relatable as possible. That's why we chose to center our project around food items—something everyone is familiar with through their own consumption habits. We believe this perspective is the most effective way to inform users about the environmental and ethical impacts of their diet. While other approaches (such as focusing on countries or production systems) are also valid, they might feel more abstract to a general audience.

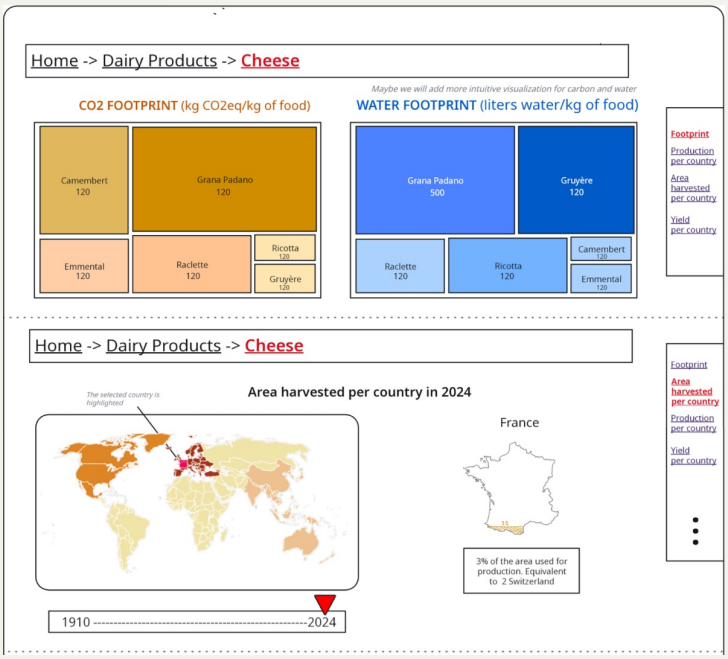
We then agreed on the key elements we wanted to visualize. First, we decided to present the carbon and water footprints of individual food items, and to allow users to compare each item with others from the same category (e.g., dairy, meat, vegetables, fruits). We also thought it would be interesting to show which countries are most involved in the production of each food item, along with the ability to filter by year.

Finally, to make the tool even more engaging and personalized, we came up with the idea of an interactive shopping basket. This feature would let users select the foods they consume, along with quantities, and instantly calculate the total carbon and water footprint of their basket. These values could then be compared to benchmarks such as the Paris Agreement targets (for staying under +1.5°C warming) or national averages like Switzerland's.

Plans and sketches

Our initial plan was to create a main page featuring our core visualizations, and to add extra pages later if time allowed.

We designed the main page to display one visualization at a time, with a side menu for easy navigation. For each food item, we aimed to show five key indicators: carbon footprint, water footprint, area harvested, production, and animals slaughtered. To make food selection intuitive, we used two treemaps—one for carbon and one for water footprint—that serve both as visual tools and selection interfaces. For geographic data (area, production, animals), we used a unified layout: a world map showing country-level data, a comparative chart with real-world equivalents (e.g., area of Paris), and a year selector. By Milestone 2, this formed the core of our website :



Milestone 2 website sketch

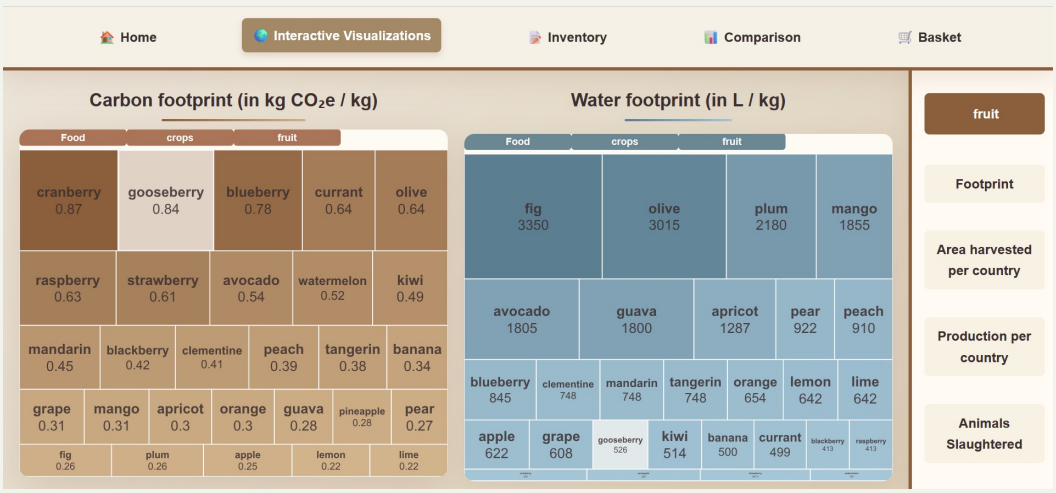
After Milestone 2, we added several features to improve usability and impact: a top navigation bar, an inventory page with food footprint data and bar chart race plots for production data, a comparison page to contrast multiple food items, an interactive shopping basket to estimate a meal's total impact, and a homepage to introduce the project and guide users.

Implementation

Dual Treemaps: Carbon and Water Footprint Overview

This visualization consists of two synchronized treemaps—one for carbon footprint and one for water footprint. They contain the same food items, categorized hierarchically (e.g., dairy, vegetables), but display different values (CO_2eq vs. liters of water per kg).

- The default active element is "Food", which includes all items.
- Users can explore by clicking on categories or specific foods.
- Both treemaps update simultaneously, and the selected item is shown in the sidebar.
- Items are sorted from highest to lowest footprint, with a color gradient from dark (high) to light (low).
- Hovering over an item highlights it in both treemaps, allowing for immediate visual comparison of its carbon and water impacts relative to similar items.



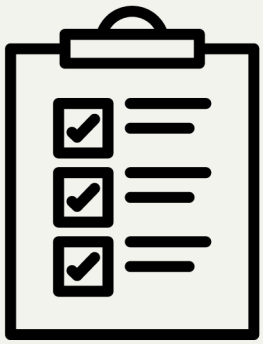
Main Challenge: We initially tried using D3's treemap, but it required parent values to be the sum of children, while we needed to display averages. As a result, we built a custom treemap component to meet our needs.

World Maps

When the selected item in the treemap has available production data (harvested area, or animals slaughtered), a visualization is displayed, one for each metric (if available). Each visualization includes:

- Left: A world map with a color gradient indicating the most involved countries, with interactive selection.
- Right: A comparison between the selected country's value and an intuitive reference (e.g., area of Paris or population of Zürich).
- Bottom: A time slider to choose the year of interest.

Inventory



The inventory allows users to select a food item or category via a dropdown menu and displays:

- Carbon and water footprints shown on horizontal bars, scaled from 0 to the highest footprint in the dataset.
- If available, bar chart races for production, area harvested, and number of animals slaughtered are shown to illustrate changes over time.

Comparison Tool

The comparison tool lets users select two or more food items using a file-explorer-style interface with a breadcrumb trail for easy navigation. After selection, clicking "Compare" displays a bar chart comparing the carbon and water footprints of the chosen items.

Interactive Shopping Basket

The interactive shopping basket lets users select any food items and specify quantities (in grams) using a file-explorer-style interface with breadcrumb navigation. As items are added or removed, the total carbon footprint is updated in real time. At the top of the page, users can compare their basket's footprint to reference values: the per capita carbon budget to stay below +1.5°C (Paris Agreement) and the average water footprint of a Swiss resident.

Challenges faced

One major challenge was merging the two datasets, which involved time-consuming name matching and handling unmatched items. We also put effort into defining a rustic visual identity and adapting all visualizations to match in style and color. Integrating and positioning each visualization on the website was complex, as was making the layout responsive across different devices. Finally, designing the visualizations themselves required multiple iterations and refinements.

Peer assessment

- Ariane focused on merging the datasets and on to the world map visualizations.
- Louis developed the site structure, designed the dual treemaps, and implemented the interactive shopping cart.
- John contributed to the world map views and worked on the bar chart race visualizations
- For the rest, everyone contributed to discussions, design decisions, implementing and refining the visualizations.