Module 1 – Foundations of Sustainable Agri-Food Systems & Circular Economy

Think-Pair-Share Activity: Food-Print Snapshot

Lesson A
Grouping: Pairs or small groups (3–4)
Time: 25-30 minutes

Materials:

Pens/markers; optional ruler or highlighters, device or printed labels for ingredient origin info (optional), scratch paper for drafting cause-and-effect loops

Objective:

Every meal you eat has an environmental footprint. Ingredients require land, water, and energy to produce. Some create waste by-products like packaging, bones, or methane from livestock. These impacts affect the planet's health, known as Planetary Boundaries, such as climate change, freshwater use, or land-system change.
Meals also connect to Sustainable Development Goals (SDGs), global goals for a fair and sustainable future. For example:

- Climate Action (SDG 13): Reducing greenhouse gas emissions.
- Responsible Consumption & Production (SDG 12): Using resources wisely and reducing waste.
- Life on Land (SDG 15): Protecting forests and biodiversity.

Your task is to investigate a meal, map its environmental impacts, and propose a circular or sustainable solution. Analyze a recent lunch meal by mapping two main components to food miles, resource use, and waste outputs. Connect impacts to two planetary boundaries and two Sustainable Development Goals (SDGs), and propose at least one circular solution. Use reasoning and examples — don't just guess!

Instructions:

1. Pick a Meal – Choose a recent lunch, dinner, or favorite food. Write down its main ingredients.
2. Find Its Journey – For each ingredient, guess where it came from, how far it traveled (food miles), what resources it needed (land, water, energy), and what waste or leftovers it made.
3. Match the Impacts – Connect your meal to Planetary Boundaries and Sustainable Development Goals (SDGs) that it affects.
4. Draw the Chain – Show how your meal goes from being made → transported → impacting the environment and people. Use arrows and keywords.
5. Fix It! – Think of at least one way to make the meal more sustainable (swap an ingredient, change packaging, reduce waste, etc.).
6. Share – Give your group's quick (1–2 minute) presentation of your findings and ideas.

Key Terms Refresher:

- Food Miles – the distance food travels to you.
- Planetary Boundaries – environmental limits for a safe Earth.
- Circular Economy – waste becomes a resource.
- SDGs – UN Sustainable Development Goals.
- Trade-Off – gaining one benefit at another's cost.

Your Task:

You're going to be a meal investigator — figuring out where your food comes from, what resources it uses, and how to make it better for the planet.
Goal: Spot the ingredient with the biggest footprint and come up with a smart, realistic way to make it better — even if there's a trade-off. Afterwards, present your ideas in a 1-2 minute pitch.

Step 1: Pick a Meal to Model
Choose a recent lunch, dinner, or favorite food. Write down its main ingredients.
Example: Cheeseburger → beef patty, cheese, bun, lettuce

Meal Name (e.g. Cheeseburger, Bean Burrito, Sushi Roll):

List main ingredients:

Step 2: Break Down the Meal
For each ingredient, guess [educated guess] where it came from, how far it traveled (food miles), what resources it needed (land, water, energy), and what waste or leftovers it made.

Component	Likely Origin/Food Miles *(circle one)*	Land/Water/Energy Notes *(choose any)*	Waste/By-products	Packaging Type *(circle one)*
Example: Beef patty	Local (0–100 mi) / Regional (100–500 mi) / National (500–1500 mi) / International (1500+ mi)	High Land / High Water / High Energy / Low Use	Methane, bones, manure	Plastic / Paper / Cardboard / None
	Local (0–100 mi) / Regional (100–500 mi) / National (500–1500 mi) / International (1500+ mi)	High Land / High Water / High Energy / Low Use		Plastic / Paper / Cardboard / None
	Local (0–100 mi) / Regional (100–500 mi) / National (500–1500 mi) / International (1500+ mi)	High Land / High Water / High Energy / Low Use		Plastic / Paper / Cardboard / None
	Local (0–100 mi) / Regional (100–500 mi) / National	High Land / High Water / High Energy / Low Use		Plastic / Paper / Cardboard / None

	(500–1500 mi) / International (1500+ mi)			
	Local (0–100 mi) / Regional (100–500 mi) / National (500–1500 mi) / International (1500+ mi)	High Land / High Water / High Energy / Low Use		Plastic / Paper / Cardboard / None

Step 3: Map Impacts
Match the Impacts – Connect your meal to Planetary Boundaries and Sustainable Development Goals (SDGs) that it affects.

Planetary Boundaries (check the two most relevant Planetary Boundaries):

☐ Climate change ☐ Biogeochemical flows (N, P) ☐ Stratospheric ozone

☐ Biosphere integrity ☐ Novel entities (pollutants, plastics) ☐ Atmospheric aerosols

☐ Land-system change ☐ Ocean acidification

☐ Freshwater change

Related SDGs (check two most relevant SDGs):

☐ Zero Hunger ☐ Affordable & Clean Energy ☐ Climate Action

☐ Good Health & Well-being ☐ Decent Work & Economic Growth ☐ Life Below Water

☐ Clean Water & Sanitation ☐ Responsible Consumption & Production ☐ Life on Land

Step 4: Build Your Cause-and-Effect Chain
Show how your meal goes from being made → transported → impacting the environment and people.
(Use arrows and key words to show the path from production → processing/transport → environmental & social impacts → feedback effects)
Example: Beef patty → livestock methane → climate change → extreme weather → crop disruption → feedback on food supply

_____ → _____ → _____ → _____ → _____

Step 5: Circular / Sustainable Solutions

Think of one way to make the meal more sustainable (swap an ingredient, change packaging, reduce waste, etc.).
Example:

Idea (Swap / Redesign / Policy)	What It Changes	Expected Benefit
Swap beef → bean patty	Reduces methane, land/water use	Lowers GHG emissions ~90%, saves water, trade-off: taste

Idea (Swap / Redesign / Policy):

What It Changes:

Expected Benefit (GHG, Water, Waste, Equity, etc.):

Reflection:

Which component had the largest footprint, and why?

Which SDG connection surprised you the most?

Which circular solution seems most realistic, and what is the expected benefit?

Skills You'll Use

- Systems thinking
- Cause-and-effect reasoning
- SDG & planetary boundary mapping
- Evidence-based justification

Example:

For example, if you choose a cheeseburger, you might find that the beef patty has a very large environmental footprint because of the land and water needed for cattle and the methane they produce. By swapping the beef patty for a bean patty, the greenhouse gas emissions per gram of protein would drop by around 90 percent, and much less land and water would be required. The dairy used to make the cheese could also have its by-products, such as whey, turned into snacks or animal feed so that nothing goes to waste. A trade-off may be taste or supply chain adjustments.