Teacher Guide (Page 1-5) & Rubric (Page 6-) for Module 1 HOA C: Low-Impact Diet Challenge (Student Sustainability Project)

Overview & Purpose: In this Hands-On Activity, students apply foundational concepts from Module 1 (sustainable agri-food systems, circular economy, and systems thinking) to their personal lives by modifying their diet for one week. The **Low-Impact Diet Challenge** engages students in experiential learning about how dietary choices affect climate and resource use. Students will choose a specific diet-based action (e.g., eliminate red meat, reduce processed/packaged foods, etc.), implement it, collect data, and analyze the impact in a lab report. This activity reinforces **Menus of Change principles** (like plant-forward diets and transparency in food choices) and connects to SDGs, notably **SDG 13: Climate Action**, **SDG 12: Responsible Consumption & Production**, and **SDG 3: Good Health & Well-Being**, by highlighting how personal consumption changes can contribute to global sustainability goals. Students practice scientific inquiry (tracking and data analysis) and **systems thinking** by extrapolating personal changes to societal impact.

Learning Objectives: By the end of this activity, students will be able to:

- Quantitatively **analyze the environmental impact** (CO_2 emissions, water usage, waste generation) of a given food item or diet pattern using provided data (environmental footprints), and calculate the reduction achieved through dietary change. (Addresses NGSS Science Practice: Using Mathematics and Computational Thinking; and aligns with curriculum goal of evaluating food choices with environmental metrics.)

- Apply **systems thinking** to explain how an individual dietary choice scales up within food systems (e.g., implications for agriculture, climate, water, waste management) and how it relates to circular economy principles (reducing waste and closing resource loops). Students should make connections such as livestock demand influencing land use and deforestation, or reduced packaging demand influencing waste streams.

- Reflect on and articulate the **personal, social, and economic dimensions** of changing one's diet, demonstrating self-monitoring and honest evaluation of challenges and benefits. They will examine behavioral aspects (habit formation, cultural influences) alongside environmental outcomes, fostering a holistic understanding of sustainable consumption.

- Produce a well-structured **lab report** that integrates data and argumentation. They must support claims (e.g., "my change saved X kg CO_2") with evidence from their experiment and/or class resources, and present a coherent argument about the significance of their findings (practicing evidence-based reasoning and scientific communication).

Time & Logistics:

- **Introduction in Class:** ~20 minutes. During Module 1 Lesson C, after covering relevant content (climate-friendly diets, etc.), introduce the challenge. This includes explaining instructions, helping students brainstorm feasible diet changes, and clarifying how to collect data. If time permits, have a short Think-Pair-Share where students discuss potential actions and anticipate challenges (leveraging peer ideas to refine their plans).

- **Duration of Student Experiment:** 1 week (out-of-class). Students will need 5–7 days to carry out the diet change and record data. This is largely an **independent/home project**. Ensure the schedule avoids major school holidays or events that could disrupt eating patterns (or plan accordingly).

- **Mid-Week Check-In:** ~10 minutes. A few days into the week, do a quick check-in (e.g., a class circle or online forum post) to ask how it's going, address any issues, and keep students accountable. This can be informal, sharing challenges or tips (e.g., one student might share a recipe they found for a meatless meal, another might mention a surprising difficulty, prompting group problem-solving).

- **Wrap-Up Discussion:** ~20 minutes (after the week, once data is collected). Before students dive into writing the lab report, hold a debrief discussion. Possible prompt: "What was the most surprising thing you experienced or learned during the diet challenge?" Connect student anecdotes back to course concepts. For example, if a student mentions it was hard to find affordable veggie options, discuss economic and access dimensions of sustainable food (food deserts, cost of healthy food). If a student loved a plant-based alternative, highlight how consumer demand can shift markets (systems change). Reinforce the positive impacts by perhaps aggregating class data on the board ("Collectively, our class avoided ~300 kg CO_2!") to show **collective impact**, tying into systems thinking.

- **Report Writing:** Students may need one class period or homework time (~1–2 hours) to work on their HOA lab reports. Consider allocating a class period for writing or peer review, especially if this is the first lab report in the course. Provide the Lab Report Template and Rubric so expectations are clear. If possible, allow students to consult each other or the instructor on calculations during this time.

Materials Needed:

- **Student Instruction Handout** (provided above), either printed or posted digitally. Ensure they have access to the impact multipliers (CO_2, water values) in the instructions or as a separate reference sheet.

- **Data Collection Journal** worksheet, printed for each student or shared as an editable digital document. This structured log greatly helps students record consistent data and reflections.

- **Background Resources:** Any slides or notes from Lesson C on sustainable diets, Menus of Change principles, climate data, etc. (Students might refer to class notes when justifying their chosen action in the report, e.g., citing that "food is ~26% of emissions"ourworldindata.org or referencing Menus of Change.) Consider providing an example or two of the math (like a sample calculation of beef vs beans emissions) either on the board or handout.

- **Optional:** If available, **Menus of Change principles summary** (students have seen some in Lesson C). Also, a copy of the **rubric** for the assignment for student reference while writing (transparency in assessment criteria helps them focus their efforts).

Teacher Preparation:

- Review the Student Instructions and Journal beforehand. Identify which impact multipliers you want them to use (the handout provides common ones). If you prefer to use different data or simplify (for instance, maybe just focus on CO_2 and skip water for easier math), adjust instructions accordingly. The provided numbers come from reputable sources (EWG, Poore & Nemecek 2018, Water Footprint Network) and are already simplified for high-school level.

- Anticipate the types of actions students might choose. Some might choose overlapping actions (many will target meat or packaged snacks). Be ready to support less common choices (if a student proposes something creative like "Only eat organic" or "No fast food", those are valid but harder to quantify; guide them to either include an environmental angle or choose something measurable).

- **Parental Communication:** It could be wise to inform parents about this project, since it involves dietary changes at home. A brief note explaining the challenge and emphasizing that students may do a *simulated* version if a real change is not feasible will preempt concerns. Encourage parents to support their teen's efforts (e.g., accommodate a meatless meal or provide reusable containers).

- **Safety and Inclusivity:** Ensure students' chosen actions won't compromise their health or well-being. For example, if a student has a medical condition or sports requirement that complicates diet changes, modify the plan (perhaps focus on waste reduction rather than caloric intake changes). Emphasize that this is *not* about weight loss or restrictive dieting for health, but about environmental impact, all students should maintain a nutritionally adequate diet through the week. If someone's action might cause conflict at home (maybe food choices are limited by family), offer the simulation alternative or a different approach (like focusing on

lunch at school, where they have control).

Facilitation Notes:

- **Launching the Project:** Link the activity to what was learned in class. For instance, recall a graph or discussion from Lesson B or C about carbon footprints of foods. Ask, "Which foods have the highest impact? What could we do about that as consumers?" This primes them for the challenge. Introduce the Low-Impact Diet Challenge as a way to **empower students**, it's an experiment where *they* are the scientist and the subject. Generate excitement by mentioning they'll calculate real impacts and contribute to a class total. Make sure to clarify that this is not about judging anyone's normal diet; it's about experimentation and learning, not permanent mandates.

- **Guiding Action Selection:** Some students might be overly ambitious (e.g., "I'll go vegan cold-turkey"). While enthusiasm is great, help them set *achievable* goals. It's better to succeed at a modest change than to burn out on day 2 of an extreme change. For example, if a student eats beef every day, cutting it entirely might be hard, maybe suggest they try vegetarian until dinner, or something attainable. Conversely, if a student already never eats beef (e.g., vegetarians), encourage them to pick a different challenge (maybe dairy or waste). Aim to avoid a situation where a student has "nothing to change"; there's usually some area (if not diet, then waste or sugary drinks or sourcing) for everyone. Approve each student's plan or have them submit a one-liner proposal by end of class to ensure suitability.

- **During the Week:** Encourage students to use the journal daily. You might send a mid-week reminder via email or your learning platform: "Remember to log your meals and experiences for the Low-Impact Diet Challenge! How's Day 3 going? 🙂 Feel free to reply with any cool discoveries or if you need help!" This maintains momentum and shows your support.

- **Differentiation & Accommodations:** This project has a real-life, open-ended nature, which can benefit different types of learners. For students who struggle with organization, the provided journal is a scaffold, check that they're filling it in. For English language learners, allow them to take notes in their first language in the journal if needed, then translate key points for the report. The mathematical part is straightforward multiplication; if a student is not confident with unit conversions (kg to lbs, etc.), provide direct conversion factors or even a spreadsheet to plug numbers in. You may pair students to discuss their calculations before writing. If a student cannot run the experiment at home (due to family resistance or other issues), allow them to do a **pure research project**: e.g., they could interview someone who has a sustainable diet or analyze a hypothetical scenario with provided data. This way they still practice analysis, even if the "hands-on" portion is altered.

- **Ethical Considerations:** Be sensitive to students' personal or cultural relationships with food. Frame the activity in terms of environmental impact, not moralizing anyone's diet. If a student feels uncomfortable sharing what they eat (some might be self-conscious), assure them the goal is not to shame but to learn. They don't have to broadcast their diet to peers; the journal and report can be private between student and teacher. The class discussions can focus on general observations or things learned, rather than requiring each student to divulge personal details if they're shy.

- **Connecting to Menus of Change and SDGs:** Throughout, reinforce the terminology and frameworks introduced in Module 1. For example, when debriefing, explicitly mention, "You were all, in effect, *practicing Menus of Change Principle #4 – plant-forward eating – and Principle #10 – less red meat menusofchange.org. How did it feel to put those into action?" Also, draw the line to SDGs: "By doing this, you contributed (even if in a small experimental way) to SDG 13 (reducing GHG emissions) and SDG 12 (reducing waste and promoting sustainable consumption)." This helps students see the relevance of high-level concepts in their daily lives.

Assessment:

Collect and grade the **Lab Reports** using the rubric categories below. You may also review the Data Collection Journals (optionally for credit or feedback) to ensure students are engaged with the process. The lab report is the primary assessed component, demonstrating students' understanding and skills in analysis and reflection.

Rubric – Low-Impact Diet Challenge Lab Report

Assess each student's lab report on the following criteria. A sample achievement description is provided for each category at the **Proficient/Excellent** level (full points). Adjust points or rubric structure as needed (e.g., you may score on a 0–4 scale per category or assign point values as suggested totaling 20 points).

- **Impact Analysis (5 points):** The report presents a clear, accurate quantification of the environmental impact of the student's dietary change. The student correctly uses provided multipliers to calculate CO_2 emissions saved, water saved, and/or waste reduced, showing the baseline vs. experiment difference. The data is presented understandably (numbers are contextualized with units). *Full credit:* Calculations are accurate (or very close, with minor arithmetic errors at most) and the student demonstrates understanding of what the numbers mean. They might say, for instance, "I avoided 15 kg CO_2, which is about a 60% reduction in my weekly food emissions compared to baseline," showing they grasp magnitude. **Partial credit** if calculations are done but with minor mistakes or missing units/clarity. **Needs improvement** if major errors in math or no quantitative analysis.

- **Argumentation & Use of Evidence (5 points):** The student supports their claims and conclusions with evidence, both from their own data and relevant course content or research. In the Introduction or Discussion, they cite facts or references (e.g., noting beef vs. beans footprints from class readings) to justify their approach static.ewg.org. They use their results as evidence to discuss sustainability (e.g., "My experiment demonstrates how much water can be saved, 10,000 liters, by one person in one week, supporting the argument that dietary shifts can help conserve freshwater thepoultrysite.com."). *Full credit:* The report contains specific evidence (numbers from results, references to at least one external data point or class source) and the student builds a logical argument about the significance of the findings. The writing should answer **why** the change matters with evidence ("because data shows X, this is important"). **Partial credit** if evidence is present but thin or not well integrated (e.g., they give results but don't connect to broader facts, or vice versa). **Needs improvement** if the report is mostly opinion with little data support, or assertions lack factual backing.

- **Systems Thinking (5 points):** Look for indications that the student considered the broader system implications of their personal change. This can be in a dedicated part of Discussion or woven throughout. *Full credit (Excellent):* The student explicitly discusses how their action relates to larger **food system** elements or outcomes. For example, they might mention impacts on supply and demand ("If many people cut beef, less cattle farming would be needed, potentially reducing deforestation and methane emissions globally"), link to SDGs ("this personal change scales up to climate action and resource conservation globally"), or mention unintended consequences/trade-offs (perhaps noting if they ate more of another food, what impact that has, e.g., more almonds instead of beef has low CO_2 but high water,

demonstrating nuance). They demonstrate an understanding that their experiment is a small part of a complex system and articulate those connections. **Proficient:** The student makes at least one connection to a larger scale or different part of the system (e.g., mentions population impact or another node like waste or economics). **Needs improvement:** The reflection stays only at the personal level with no mention of broader context (e.g., only "I saved water" without asking what that means beyond themselves).

- **Reflection & Self-Monitoring (3 points):** This category evaluates the personal reflection quality and how well they documented and learned from their experience. *Full credit:* The student offers a thoughtful reflection on their success/challenges, demonstrating honesty and insight. They clearly describe challenges faced and how they managed them (or not), and any personal changes (attitudes, awareness) that resulted. They also note any health or cost observations if relevant, and they acknowledge what helped or hindered them (self-monitoring of behavior). Essentially, you're looking for depth: did they just say "it was easy" or "it was hard", or did they delve into *why* and what that means for future behavior? Full points if they provide specific examples from their journal (e.g., "By day 4 I felt craving for sugar, which showed me how habitual my soda intake was"). **Partial credit** if reflection is present but somewhat superficial (e.g., generic statements like "This was hard but I did it" without detail). **Needs improvement** if reflection is minimal or the student did not describe their personal process much at all.

- **Lab Report Format & Clarity (2 points):** This addresses whether the student followed the scientific report format and communicated their findings clearly. *Full credit:* The report includes all required sections (Intro, Methods, Results, Discussion, Conclusion, may not be labeled but content is there in logical flow). It is well-organized and written clearly, with proper grammar and only minor typos. Data is presented in an understandable way (tables or sentences with units, etc.), and any sources are cited (in any consistent format). The tone is appropriately formal/scientific where needed, and the length is within assigned range. **Partial credit:** if the report is mostly good but maybe missing one minor section or has a few clarity issues (e.g., results and discussion somewhat mixed, or some grammatical issues that don't impede understanding). **Needs improvement:** if format is significantly lacking (e.g., missing entire sections, very disorganized text) or writing quality makes it hard to follow.

Total Points: 20 (suggested distribution above). You can adjust weighting, for instance, you might value the analysis and argumentation more heavily if aligning with particular standards.

Feedback to Students: In addition to the numeric score, provide qualitative feedback highlighting something they did well (e.g., "Great job connecting your experience to global impacts, your systems thinking was strong") and something to improve ("Be careful with units in calculations next time, and try to integrate one external reference to strengthen your evidence."). Emphasize that this project is as much about the process as the outcome, even if some students "failed" to stick perfectly to their diet change, what matters is the analysis and reflection on that outcome.

Teacher Reflection: After grading, take note of overall trends. Did many students choose the same action? What challenges were common? This can inform later discussions or future iterations of the curriculum. For instance, if a majority struggled with finding alternatives, perhaps a future lesson could explore culinary skills or local resources for sustainable eating (empowering them further). If many found it easy and rewarding, maybe these students could be encouraged to continue and even influence school policies (like advocating for Meatless Mondays in the cafeteria, linking to Module 7 on policy). Use the outcomes of this HOA to celebrate successes and address difficulties, reinforcing that **personal actions are a gateway to understanding system-wide change**.

By guiding students through the Low-Impact Diet Challenge, you are helping them connect classroom knowledge with daily life, a powerful step in fostering sustainable mindsets. This activity tends to be eye-opening for students, as they tangibly see the difference their choices can make and also confront the real-world barriers to change. It sets a tone for the rest of the Seeding Success curriculum: one of **action, inquiry, and personal engagement** with global issues. Enjoy facilitating this journey, and seed success in your students' learning and growth!

Sources for Teacher Reference: Menus of Change Principles (CIA/Harvard) menusofchange.org, Environmental Working Group (2011) Meat Eater's Guide for emissions data static.ewg.org, Water Footprint Network for water data thepoultrysite.com, Our World in Data for food system statistics ourworldindata.org. (These have been integrated into student materials with citations.)