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

Student Notes Answers

These notes are designed to help you understand the main ideas, vocabulary, and concepts from Module 1. Each section matches the learning outcomes and activities discussed in class. Use these notes to study for quizzes, complete projects, and participate in discussions.

Note: Vocabulary words marked with an asterisk (*) are required knowledge. Unmarked words are included for personal enrichment.

Lesson A – Why Food Systems Matter: Planetary Boundaries and SDG's

Vocabulary in Context: Fill in the Blanks\

1. The three pillars of a sustainable food system are **people, planet, and profit**.
2. **Planetary boundaries** define the environmental limits we must stay within for a stable planet.
3. Clearing forests for farmland contributes to **Biosphere Integrity** loss.
4. The **Sustainable Development Goals** set a 2030 roadmap for ending poverty and protecting the planet.
5. Food systems are responsible for about 33**%** of **global greenhouse gas emissions.**
6. Producing more food without addressing waste may harm the **profit** principle.
   Nutrient pollution from nitrogen and phosphorus leads to algae blooms and dead zones.
7. Ensuring all people have reliable access to healthy food is called **food security**.

Self-Test

1. A **Sustainable Food System** delivers nutritious food while protecting environmental, economic, and social foundations.
2. The three pillars of sustainable Food Systems are **People – Planet – Profit**
3. **Planetary Boundaries** are the environmental limits humanity must stay within to maintain a stable Earth system.
4. Protecting **Biosphere Integrity** helps maintain species diversity and ecosystem stability.
5. Agriculture is a major contributor to global **Greenhouse Gas (GHG) Emissions**.
6. The **Sustainable Development Goals (SDGs)** aim to end poverty, protect the planet, and ensure prosperity by 2030.
7. Clearing forests for farmland contributes to **Deforestation**.
8. Excess fertilizer runoff leads to **Nutrient Pollution**, harming water systems.
9. Ensuring all people have reliable access to nutritious food is called **Food Security**.
10. A **Circular Economy** keeps resources in use and minimizes waste by cycling materials back into the system.

Lesson B – From Linear to Circular: Rethinking Food Production

Vocabulary in Context: Fill in the Blanks

1. A **Linear Economy** follows the path "take → make → waste," leading to resource loss.
2. The **Circular Economy** approach keeps resources cycling and reduces waste.
3. Farming with crop diversity, nutrient cycling, and natural pest control is called **Agroecology**.
4. Going beyond sustainability to restore soil and water cycles is **Regenerative Agriculture**.
5. The movement of nutrients back into soil for reuse is called **Nutrient Cycling**.
6. Returning organic waste to the soil through decomposition is **Composting**.
7. Packaging materials that are repaired or reused belong to the **Technical Cycle**.
8. A leftover material from production, such as citrus peel, is called a **By-product**.
9. The process of turning waste into usable materials or products is called **Waste-to-Resource**.
10. Using brewery grain to grow mushrooms is an example of **Waste-to-Resource** innovation.

Self-Test

1. A **Linear Economy** design leads to waste accumulation and resource depletion.
2. **Circular Economy** systems close the loop and mimic nature's recycling processes.
3. A **By-product** is leftover material that can be transformed into something useful.
4. **Composting** involves breaking down organic matter into soil nutrients.
5. The **Technical Cycle** keeps materials like metals and plastics in use through repair and recycling.
6. **Regenerative Agriculture** restores ecosystems while improving agricultural productivity.
7. In **Agroecology**, farms operate as living ecosystems with biodiversity and nutrient reuse.
8. The **Biological Cycle** returns nutrients from organic waste to the soil.
9. **Waste-to-Resource** innovation creates value from discarded materials.
10. Growing mushrooms from brewery waste is an example of **Waste-to-Resource** practice.

Lesson C – Pathways to Action: Diet, Innovation, & Policy

Vocabulary in Context: Fill in the Blanks

1. Reducing meat consumption in favor of plant-based proteins is an example of **Dietary Shifts**.
2. Creating new technologies or processes to reduce waste is known as **Innovation**.
3. Laws or incentives that encourage sustainable food practices are examples of **Policy**.
4. The measure of **CO_2 emissions** is used to compare greenhouse gas emissions across activities.
5. Plant-based burgers and lab-grown meat are examples of **Alternative Proteins**.
6. Farming that uses vertical space or rooftops in cities is called **Urban Farming**.
7. A **Circular Business Model** turns waste into profitable resources.
8. A government commitment to halve edible food waste by 2030 is a **Food-Waste Target**.
9. Financial rewards for farmers who use soil-building methods are called **Regenerative Agriculture Incentives**.
10. Looking at all parts of a food system and how they interact is **Systems Thinking**.

Self-Test

1. **Dietary Shifts** align eating habits with environmental and health goals.
2. Designing new solutions for food production and waste reduction is called **Innovation**.
3. Creating rules and incentives for sustainable practices is an example of **Policy**.
4. Greenhouse gas emissions are often measured in **CO_2 emissions**.
5. Edible insect flour and plant-based meats are examples of **Alternative Proteins**.
6. Growing food in buildings or on rooftops is **Urban Farming**.
7. A **Circular Business Model** captures value from materials that would otherwise be discarded.
8. Halving edible waste by a specific date is an example of a **Food-Waste Target**.
9. Payments to farmers for using eco-friendly practices are **Regenerative Agriculture Incentives**.
10. Understanding how different parts of the food system influence one another is **Systems Thinking**.