



Module 6: Agri-Systems Across the City-Rural Gradient

Student Notes Answers

Lesson A – From the Balcony to Back-Forty

Important Vocabulary to understand and use:

1. A system composed of the physical environment, human labor, and technology used to grow, process, and deliver food: **A. Agri-System**
2. The area just outside city boundaries where urban and rural land uses mix **C. Peri-Urban**
3. Laws and regulations that govern land use, including what kinds of farming can take place in different areas **H. Zoning**
4. Farming or gardening within city environments. Often small-scale and used for local consumption or education **B. Urban Agriculture**
5. A region where people have limited access to affordable and nutritious food **E. Food Desert**
6. The distance food travels from where it is produced to where it is consumed **F. Food Miles**
7. Traditional farming that takes place in the countryside, usually on larger plots of land **D. Rural Agriculture**
8. The right of people to have access to healthy and culturally appropriate food produced through ecologically sound and sustainable methods **G. Food Sovereignty**

Self-Test (Answers):

1. The three types of urban-rural zones in agri-systems are **Urban, Peri-Urban, and Rural** zones.
2. Urban agriculture often includes growing food on **Rooftops**, balconies, and community lots.
3. A key benefit of peri-urban agriculture is that it often supplies **Fresh** food to nearby cities.
4. Rural agriculture typically involves **Large** -scale production and longer food distribution distances.
5. “Food miles” refers to the **Distance** food travels from farm to consumer.
6. A key trade-off in urban agriculture is **Lower** productivity versus high sustainability and community benefit.
7. Rooftop farms help reduce the **Urban Heat Island** effect in cities by adding green space.
8. Peri-urban farms are often located at the **Edge** of cities and can integrate with both urban demand and rural land access.
9. One challenge of rural farms near urban markets is limited access to **Infrastructure** and longer transportation distances.
10. **Urban** agriculture can help reduce food miles and greenhouse gas emissions by producing food closer to where people live.

Lesson B – Climate-Smart Growing Spaces

Important Vocabulary to understand and use:

1. Farming practices that increase productivity, improve climate resilience, and lower emissions **A. Climate-Smart Agriculture (CSA)**
2. A hydroponic system where a thin film of water carrying nutrients flows over plant roots **C. NFT (Nutrient Film Technique)**

3. Short, frequent watering cycles that reduce water loss and improve efficiency **E. Pulse Drip Irrigation**
4. A garden bed that uses capillary action to pull water from a reservoir below the soil **B. Wicking Bed**
5. A greenhouse heated using the warmth generated by decomposing organic matter nearby **D. Compost-Heat Greenhouse**
6. A farming approach where waste is reused as input (fertilizer, energy, water), mimicking natural ecosystems **H. Circular Agriculture**
7. Charcoal-like substance made from organic waste that improves soil and stores carbon **I. Biochar**
8. The distance food travels from farm to table; fewer miles means lower emissions **J. Food Miles**
9. When urban development raises property values, often displacing existing residents or farmers **K. Gentrification**
10. A pump controller that adjusts water flow based on real-time needs, saving energy and water **G. Variable-Frequency Drive (VFD)**
11. A sensor that detects how much water is available in the soil for plants **F. Soil Moisture Probe**
12. The gap in access to technology between well-resourced and under-resourced communities **L. Digital Divide**

Self-Test (Answers):

1. **Urban** farming reuses food scraps and wicking beds to grow crops in cities.
2. Peri-urban greenhouses use **Compost** piles to passively heat crops and save energy.
3. **Smart** irrigation systems water plants only when soil moisture reaches stress levels.
4. Wind-powered pumps and VFDs eliminate **Diesel** use in rural irrigation.
5. Circular systems aim to close resource **Loops** by reusing waste as inputs.
6. The hydroponic method where nutrients flow over roots in a thin stream is called **NFT (Nutrient Film Technique)**.
7. **Biochar** is a carbon-rich soil additive made from burned crop waste.
8. One challenge of CSA in urban zones is rising land prices due to **Development Pressure**.

Lesson C – Tech & Metrics That Matter

Important Vocabulary to understand and use:

1. Water efficiency is often measured using Liters per Kilogram (L/kg) (A), which tells us how much water is needed to grow each kilogram of food. Some farmers aim to increase their Water efficiency is often measured using **Liters per Kilogram (L/kg) (A)**, which tells us how much water is needed to grow each kilogram of food.
2. When designing a farming system, comparing how much you invest versus how much yield you get is known as analyzing the **Input-Output Ratio (C)**.
3. In cities, farms are being built upward — stacked in layers — using a technique known as **Vertical Farming (E)** to save space and control growing conditions.
4. Some farmers aim to increase their **Biomass per kWh (B)** by producing more plant mass for every unit of energy consumed.
5. Growing plants in nutrient-rich water without any soil is a method called **Hydroponics (D)**.
6. Because it allows for complete control over lighting, humidity, and nutrients, **Controlled Environment Agriculture (G)** is common in urban and high-tech agriculture settings.
7. Since certain nutrients are only available at specific acidity levels, monitoring the **pH (I)** of water near the roots is essential.

8. Adding **Biochar (F)** to soil can boost fertility, store carbon, and help retain nutrients.
9. Farmers use tools to measure **Electrical Conductivity (H)**, which helps them track the concentration of nutrients or salts in irrigation water.

Self-Test (Answers):

1. A system that uses less water to grow more food is considered more **water** efficient.
2. Hydroponics can use up to **90%** less water than soil-based systems.
3. The metric that shows how much food is produced per energy unit is called **biomass per kWh**.
4. Top layers in a vertical farm get more light than lower layers due to **light** decay.
5. A **controlled** environment system uses tech to control light, nutrients, and water.
6. If a system uses 500 L of water and produces 25 kg of food, its water-use efficiency is **20 L/kg**.
7. The Vidalakis Lab citrus system saved ~90% of **water** compared to traditional farming.
8. A farm with high yield but very high energy use would have low **biomass** per kWh.
9. There is no perfect system — the best choice depends on **location, goals, and resources**.