



**LAND MANAGEMENT, ENVIRONMENT & SOLID-WASTE:
INSIDE EDUCATION AND BUSINESS IN CENTRAL ASIA
ERASMUS-EDU-2023-CBHE Project Number: 101129032**

MICRO-CREDENTIAL

**CIRCULAR ECONOMY FOR LAND AND WASTE
MANAGEMENT**

9.- Circular Economy in Agriculture and Rural Areas

Activity 2

Quiz: nutrient cycles and waste reuse



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1. What is the main objective of nutrient-loop closure?

- A. Increase fertiliser application every year
- B. Reduce nutrient losses and return useful nutrients safely to productive systems
- C. Eliminate all biological processes
- D. Store nutrients permanently outside agriculture

2. Which nutrient is especially associated with nitrate leaching?

- A. Nitrogen
- B. Carbon
- C. Silicon
- D. Calcium only

3. Why is phosphorus particularly important in circular agriculture?

- A. It has an unlimited atmospheric reservoir
- B. Agricultural phosphorus is largely obtained from a finite geological resource
- C. It cannot contribute to eutrophication
- D. Plants do not require it

4. What is a major function of soil organic carbon?

- A. It only changes soil colour
- B. It supports aggregation, water retention, nutrient cycling and biological activity
- C. It always increases soil salinity
- D. It eliminates the need for irrigation

5. What happens when nitrogen application greatly exceeds crop demand?

- A. All nitrogen is automatically stored safely in crops
- B. Losses through leaching, runoff, volatilisation or gaseous emissions may increase
- C. Soil becomes permanently fertile without environmental effects

D. No monitoring is needed

6. Which practice can reduce dependence on synthetic nitrogen fertiliser?

- A. Including legumes in crop rotations
- B. Burning all crop residues
- C. Increasing bare fallow periods
- D. Applying nutrients without soil testing

7. What is biomass cascading?

- A. Using all biomass directly for energy
- B. Using biomass sequentially from higher-value to lower-value applications
- C. Disposing of agricultural residues in landfills
- D. Applying all residues immediately to soil

8. Which simplified sequence best represents biomass cascading?

- A. Energy → Waste → Food
- B. Food → Feed → Materials → Energy → Nutrient return
- C. Landfill → Incineration → Food
- D. Fertiliser → Plastic → Water

9. Why should not all crop residues necessarily be removed from fields?

- A. Residues may contribute to soil protection and organic-matter maintenance
- B. Crop residues have no alternative uses
- C. All residues are hazardous
- D. Residue removal always increases soil carbon

10. What is composting?

- A. Anaerobic conversion of waste to methane
- B. Controlled aerobic decomposition of organic materials
- C. Chemical treatment of mineral fertilisers
- D. Burning of biomass

11. What is anaerobic digestion?

- A. Biological decomposition in the absence of oxygen, producing biogas and digestate
- B. Mechanical recycling of plastic
- C. Soil erosion control only
- D. Evaporation of irrigation water

12. Which is a main product of composting?

- A. Stable organic soil amendment
- B. Diesel
- C. Plastic polymer
- D. Phosphate rock

13. Which are the main products of anaerobic digestion?

- A. Biogas and digestate
- B. Glass and metals
- C. Diesel and coal
- D. Drinking water and oxygen

14. Why can digestate be valuable in circular agriculture?

- A. It can contain plant nutrients that may partly substitute mineral fertilisers
- B. It contains no nutrients
- C. It can always be applied without analysis

D. It automatically removes soil salinity

15. What is one major risk of inappropriate digestate application?

- A. Excess nutrient loading and groundwater pollution
- B. Permanent elimination of all nutrients
- C. Complete sterilisation of the atmosphere
- D. Reduction of all crop growth in every situation

16. Why is source separation important for compost quality?

- A. It reduces the risk of contamination by plastics, glass, metals and hazardous materials
- B. It increases contamination
- C. It eliminates biological decomposition
- D. It prevents nutrient recovery

17. What is the circular advantage of manure management?

- A. Nutrients can be recovered and returned according to crop needs
- B. All manure should be applied immediately at maximum rates
- C. Manure contains no nutrients
- D. Manure should always be treated as hazardous waste

18. What may happen if manure application exceeds the capacity of local land?

- A. Nutrient losses and water pollution may increase
- B. All nutrients remain permanently in crops
- C. Groundwater automatically becomes cleaner
- D. Soil salinity always decreases

19. Which solution best illustrates territorial circularity?

- A. A livestock farm transfers processed manure nutrients to nearby nutrient-deficient crop farms
- B. Every farm operates completely independently
- C. Organic waste is burned without recovery
- D. Wastewater is discharged untreated

20. What is industrial symbiosis?

- A. One activity's by-product becomes another activity's useful input
- B. Every industry disposes of its waste independently
- C. All agriculture becomes industrial
- D. Farms stop exchanging materials

21. Which example represents industrial symbiosis in agriculture?

- A. Brewery spent grain used as livestock feed
- B. Organic residues sent to uncontrolled dumping
- C. Clean irrigation water deliberately polluted
- D. Edible food sent directly to landfill

22. Why can water reuse be risky in arid agriculture?

- A. Poor-quality water may accumulate salts or contaminants in soil
- B. Reused water never contains salts
- C. Irrigation water quality does not affect soil
- D. Water reuse always eliminates salinisation

23. What is the main circular objective of precision fertilisation?

- A. Apply nutrients according to crop requirements and reduce losses
- B. Apply the maximum possible amount everywhere
- C. Replace soil monitoring

D. Increase nutrient surpluses

24. Which practice can capture residual nitrogen between main crops?

- A. Cover cropping
- B. Burning residues
- C. Leaving soil permanently bare
- D. Removing all vegetation

25. What is the role of legumes in nutrient cycling?

- A. Some legumes can fix atmospheric nitrogen through symbiotic biological processes
- B. Legumes remove all phosphorus from the planet
- C. Legumes eliminate the need for all nutrient management
- D. Legumes cannot contribute to soil fertility

26. Why is burning crop residues often considered a circularity failure?

- A. It can waste biomass value, reduce organic-matter return and cause air pollution
- B. It always improves soil organic carbon
- C. It produces no emissions
- D. It is the highest-value use of all biomass

27. Which statement about organic waste reuse is most accurate?

- A. All organic waste is automatically safe for agricultural use
- B. Organic residues should be characterised and safely managed before reuse
- C. Quality control is unnecessary
- D. Contaminated residues should always be applied to agricultural land

28. What is a key advantage of integrating crops and livestock?

- A. Biomass and nutrient flows can be linked more effectively
- B. Manure no longer needs management
- C. Nutrient losses become impossible
- D. External inputs always disappear completely

29. Which statement best describes a circular farm?

- A. A farm that maximises reuse regardless of environmental risk
- B. A farm that reduces losses and safely recirculates resources while protecting soil and water
- C. A farm that produces no agricultural products
- D. A farm that uses only one technology

30. Which statement best summarises circular nutrient management?

- A. Recycle as much material as possible regardless of quality
- B. Minimise unnecessary inputs and losses, then recover nutrients safely according to agronomic demand
- C. Eliminate all nutrient inputs
- D. Apply all available organic residues to the nearest field

Part B. True or false

- 31. Maximum nutrient recycling is always environmentally preferable.
- 32. Anaerobic digestion can recover energy while retaining nutrients in digestate.
- 33. Compost containing plastics and heavy metals is automatically suitable for agricultural use.
- 34. Crop residues can have competing uses, including soil protection, feed, materials and energy.
- 35. Circular agriculture can require cooperation beyond the individual farm scale.

Part C. Short-answer questions

36. Explain the difference between nutrient recycling and nutrient-use efficiency.
37. Why may complete removal of crop residues be unsustainable?
38. Give one advantage and one limitation of composting.
39. Give one advantage and one limitation of anaerobic digestion.
40. Why is circular agriculture particularly relevant for Central Asia?