

Deforestation and Reforestation Science

Environmental Science · Answer Key · 12 Questions

1. What is the primary driver of the 'edge effect' in fragmented forests, and how does it influence local carbon sequestration?

- A) Increased wind speeds and light penetration decrease humidity and promote tree mortality**
- B) Increased nitrogen runoff from neighboring agricultural lands
- C) The invasion of non-native soil pathogens that inhibit root growth
- D) Reduced population density of seed-dispersing avian species

2. Which specific biological process accounts for the largest proportion of carbon release during the deforestation of tropical rainforests?

- A) Direct combustion of leaf litter via forest floor fires
- B) Microbial decomposition of disturbed forest soils
- C) Aerobic respiration of dead wood and coarse woody debris**
- D) Photodegradation of organic matter by increased UV exposure

3. How does the 'Albedo effect' complicate the relationship between reforestation efforts in high-latitude (boreal) regions and global cooling?

- A) Increased forest cover decreases albedo, causing more solar radiation absorption and potential warming**
- B) Decreased forest cover increases albedo, causing global cooling
- C) Boreal forests increase cloud cover, leading to massive methane trapping
- D) Reforestation increases soil reflectivity, offsetting carbon uptake

4. In the context of forest succession, what distinguishes a 'primary' forest from a 'secondary' forest in terms of carbon stock dynamics?

- A) Primary forests sequester carbon at a faster rate during maturity
- B) Secondary forests have higher biomass density in the understory
- C) Primary forests contain larger pools of soil organic carbon and biomass-stored carbon**
- D) Secondary forests lack the mycorrhizal networks found in primary forests

5. Which soil nutrient cycle is most negatively impacted long-term by the conversion of tropical rainforest to cattle pasture?

- A) The nitrogen cycle due to waterlogged anaerobic soil conditions
- B) The phosphorus cycle due to the depletion of the limited pool once vegetation is removed**
- C) The sulfur cycle due to lack of atmospheric deposition
- D) The potassium cycle due to rapid leaching from volcanic bedrock

6. What is the primary mechanism by which reforestation can lead to 'hydrological drought' in semi-arid regions?

A) Increased evapotranspiration rates of fast-growing monoculture plantations

- B) Increased surface runoff preventing groundwater recharge
- C) Reduced solar shading leading to higher evaporation from the soil
- D) Depletion of mineral content in the water table

7. Why are monoculture reforestation projects often criticized for their contribution to climate change mitigation compared to natural regeneration?

A) They lack the structural diversity required to maintain complex subterranean fungal networks

B) They are more susceptible to mass mortality from species-specific pests

- C) They sequester carbon at a lower rate than naturally regenerating diverse stands
- D) They increase the soil pH too rapidly for native vegetation to recover

8. What role does 'latent heat flux' play in the climatic impact of deforestation in the Amazon Basin?

A) Deforestation reduces transpiration, leading to decreased latent heat flux and increased sensible heat, raising regional temperatures

- B) Deforestation increases latent heat flux, causing cooling
- C) Deforestation stabilizes the local atmospheric boundary layer
- D) Deforestation increases convective rainfall by heating the ground

9. Which of the following describes the 'Carbon Debt' associated with converting peatlands for oil palm plantations?

A) The amount of CO₂ released from drained peat that takes decades or centuries to be offset by oil palm growth

- B) The cost of fertilizers required to maintain soil fertility
- C) The reduction in forest biodiversity over a ten-year period
- D) The total value of timber lost during the initial clearing process

10. What effect does the loss of forest canopy have on the 'leaf area index' (LAI) and its subsequent impact on the local microclimate?

A) Lower LAI leads to higher ground temperature and increased soil moisture evaporation

- B) Higher LAI promotes deeper root penetration
- C) Lower LAI increases carbon sequestration efficiency
- D) Higher LAI prevents nutrient cycling in the soil

11. In terms of atmospheric feedback, what is the significance of Volatile Organic Compounds (VOCs) released by dense forests?

A) They act as precursors to secondary organic aerosols that reflect solar radiation and form cloud condensation nuclei

- B) They directly deplete the ozone layer
- C) They increase the concentration of greenhouse gases in the stratosphere
- D) They accelerate the breakdown of methane in the troposphere

12. What is the relationship between tree species richness and the stability of carbon sequestration in reforestation projects?

A) Higher species richness generally increases ecosystem resilience to climate-related disturbances

- B) Lower species richness allows for faster growth rates of a single, optimized carbon-sequestering species
- C) Species richness has no measurable impact on carbon turnover rates
- D) Higher richness prevents the development of canopy layers