

Advanced Deforestation and Reforestation Science

Deforestation & Reforestation · Answer Key · 10 Questions

1. Which specific process, driven by elevated atmospheric CO₂ concentrations, can lead to increased transpiration rates in forests, potentially exacerbating water stress and vulnerability to drought, even in the absence of direct deforestation?

- A) Ocean acidification
- B) Elevated CO₂ fertilization effect**
- C) Stratospheric ozone depletion
- D) Increased atmospheric nitrogen deposition

2. The phenomenon of 'tipping points' in tropical rainforest ecosystems, such as the Amazon, often relates to the forest's ability to generate its own rainfall through evapotranspiration. A sustained reduction in forest cover below a critical threshold can trigger a shift towards what dominant ecosystem type?

- A) Savanna**
- B) Desert scrubland
- C) Grassland steppe
- D) Tropical montane forest

3. Mycorrhizal fungi play a crucial role in nutrient uptake for trees. In heavily degraded forest soils, the diversity and functional capacity of these symbiotic fungi are often severely diminished. Which of the following is a direct consequence for reforestation efforts in such environments?

- A) Faster initial seedling growth due to reduced competition
- B) Increased reliance on nitrogen-fixing pioneer species
- C) Reduced seedling establishment success and slower long-term growth**
- D) Enhanced resistance to fungal pathogens

4. The carbon sequestration potential of a reforestation project is significantly influenced by the choice of tree species. Fast-growing, short-lived species, while contributing to rapid initial biomass accumulation, may have a lower net carbon benefit over long time scales compared to what type of species?

- A) Exotic invasive species
- B) Species with high wood density and slow decomposition rates**
- C) Species requiring significant soil disturbance for establishment
- D) Species with a high susceptibility to insect infestations

5. Soil erosion is a major consequence of deforestation. The loss of forest cover disrupts the soil's protective organic layer and root structure. What is the primary mechanism by which intact forest ecosystems maintain soil stability and prevent nutrient leaching?

- A) Increased soil pH through litter decomposition
- B) Continuous binding of soil particles by plant roots and organic matter**
- C) Accelerated weathering of bedrock by canopy interception
- D) Reduced soil respiration and microbial activity

6. Remote sensing technologies, particularly satellite imagery analysis, are vital for monitoring deforestation. Which spectral band combination is most effective in distinguishing between healthy vegetation, stressed vegetation, and bare soil for large-scale assessments?

- A) Visible Red and Green bands
- B) Near-Infrared (NIR) and Red bands (e.g., for NDVI calculation)**
- C) Shortwave Infrared (SWIR) and Thermal Infrared bands
- D) Blue and Green bands

7. In the context of climate change, the role of forests extends beyond carbon sequestration to regulating regional and global climate through the release of biogenic volatile organic compounds (BVOCs). The oxidation of these BVOCs can influence the formation of what atmospheric component that can have both cooling and warming effects depending on atmospheric conditions?

- A) Sulfur dioxide
- B) Ozone (tropospheric)**
- C) Ammonia
- D) Carbon monoxide

8. The concept of 'biodiversity hotspots' is often linked to areas with high rates of deforestation. What is the primary criterion used to define a biodiversity hotspot?

- A) High population density of endangered species
- B) High endemism (species found nowhere else) and significant habitat loss**
- C) Presence of unique geological formations
- D) Abundant freshwater resources

9. Reforestation strategies often involve assisted natural regeneration (ANR). What is the key principle behind successful ANR in degraded tropical landscapes?

- A) Planting large numbers of genetically modified seedlings
- B) Creating artificial shade structures to mimic forest canopy
- C) Implementing low-cost interventions to encourage natural seed dispersal and seedling establishment**
- D) Intensive weeding and fertilization of existing vegetation

10. The hydrological cycle is significantly impacted by deforestation. Reduced forest cover leads to decreased evapotranspiration, which can alter regional precipitation patterns. Furthermore, what is a direct consequence for streamflow and water availability, particularly during dry seasons?

- A) Increased base flow and reduced flood peaks
- B) Decreased base flow and increased flood peaks**
- C) Stabilized streamflow throughout the year
- D) Reduced sediment transport in rivers