Teacher Answer Key

Case Study

1. By fixing atmospheric N_2, Trichodesmium adds new nitrogen to surface waters, which fuels phytoplankton growth, supports zooplankton grazing, and strengthens food-web productivity.

2. Extra fixed nitrogen enhances carbon fixation; more organic carbon can sink or be exported, modestly strengthening the biological pump and influencing CO_2 drawdown.

Multiple Choice

1. D

2. C

3. A

Matching

1-C, 2-E, 3-D, 4-A, 5-B

Fill-in-the-Blank

1) nitrogen, 2) heterocysts, 3) photic

Short Answer (Sample Responses)

Q1: Nitrogen is often the limiting nutrient offshore; adding bioavailable nitrogen unlocks photosynthesis, increasing primary production even where light is adequate but nitrate is scarce.

Q2: Use of phycobilins (and small cell size) widens usable wavelengths, allowing efficient photosynthesis in blue-lit, deeper layers.

Q3: Risks include toxins or oxygen depletion harming wildlife and people; mitigation includes reducing nutrient runoff, improving wastewater treatment, and temperature/runoff monitoring.