Biomes Study Sheet with Human Impacts

1. Permafrost & Feedback Loop: Melting permafrost releases CO■ & methane → more warming → more melt.

2. Why Care?: Accelerates climate change → extreme weather, sea level rise, ecosystem collapse.

3. Hockey Stick Graph: Shows sharp recent CO■/temp rise; permafrost adds to this rise.

4. Methane vs CO■: Methane ~25x stronger heat trapper short-term, more dangerous initially.

5. Land Productivity Limits: Temperature & precipitation.

6. Boreal Tree Adaptations: Needle leaves, waxy coating, conical shape, dark green color.

7. Temperate Forest Heat: Canopy traps heat; ocean moderates climate.

8. Leaf Color Change: Chlorophyll breakdown reveals carotenoids & anthocyanins.

9. Shrubland Fruits: Cool nights = less sugar use; warm days = more sugar → sweeter fruit.

10. Grassland vs Shrubland: Grasslands inland/higher latitude → colder winters.

11. Rainforest Soils: Nutrients leached by rain; stored in biomass not soil.

12. Kauai Phosphorus: Dust from Gobi desert provides missing phosphorus.

13. Savanna Trees: Seasonal rain; long dry season limits tree density.

14. Desert Productivity: Limited by water availability; high evap. loss.

15. Aquatic Biomes Factors: Salinity, depth (light), water flow.

16. Chesapeake Bay: Example of nutrient pollution → eutrophication & dead zones.

Major Human Impacts by Biome

Tundra: Oil & gas drilling, pipelines, mining scars; melting permafrost releases greenhouse gases.

Boreal Forest (Taiga): Logging, oil extraction, mining; climate change → fires & pest outbreaks.

Temperate Forest: Deforestation, urban expansion, pollution (acid rain), invasive species.

Seasonal Temperate Forest: Habitat fragmentation, overhunting, climate change alters cycles.

Woodland–Shrubland: Urbanization & wildfires, overgrazing, agriculture (vineyards/olive groves).

Temperate Grassland: Converted to cropland, overgrazing causes erosion, fire suppression alters balance.

Tropical Rainforest: Deforestation for logging, cattle, palm oil; mining & roads reduce biodiversity.

Tropical Soils: Slash-and-burn, monocultures deplete nutrients, fertilizer runoff pollutes water.

Savanna: Poaching, overgrazing → desertification, fire suppression disrupts ecosystem.

Subtropical Desert: Off-road vehicle damage, urban sprawl, water depletion from irrigation.

Aquatic Biomes: Pollution (plastic, fertilizer), overfishing, dams alter rivers, ocean acidification.

Chesapeake Bay: Agricultural runoff → eutrophication, overfishing, sediment pollution, sea level rise.