Keep the forest functioning

Sustainable forestry manages forest use while maintaining regeneration and ecological functions. Forests supply wood, store carbon, protect soil and water, and provide habitat; timber volume is only one measure of success.

1. THREE WAYS TO MITIGATE DEFORESTATION

Reforestation	Restore tree cover on previously forested land through planting or natural regeneration. Establishing trees can rebuild habitat and carbon storage over time; protecting seedlings and checking survival matter as much as planting them.
Responsible wood use	Use and buy wood harvested through ecologically sustainable forestry. Evaluate how the forest is managed: regeneration, retained habitat and protection of soil and water matter, not just the amount of wood produced.
Reuse wood	Repair and reuse suitable furniture, building materials or other wood products. Extending useful life can reduce demand for newly harvested wood when reused products replace new ones. This reduces pressure rather than directly regrowing a forest.

2. EXTENSION: REPLANTING IS NOT INSTANT RESTORATION

A young plantation does not immediately replace a mature forest with varied tree ages, cavities and dead wood. Species suited to the site and a plan for long-term survival support recovery. Track regeneration and habitat development over years, not simply the number of seedlings planted. Protecting an existing forest and restoring a cleared one are complementary actions.

3. HARVEST WITH REGENERATION IN MIND

Ecological forestry retains important forest structures and allows recovery between interventions. Removing selected trees can retain cover, but the label alone does not prove sustainability. What remains, what regenerates and how the site is disturbed all matter.

Restoration functions: USDA Forest Service, Restoration, Reforestation and Regeneration.
Site suitability and seedling survival: USDA Forest Service, Plant-A-Tree Program.
Retained structure and recovery: Franklin et al., Principles for Ecological Forestry.

Scope: College Board AP Environmental Science CED, Topic 5.17, p. 113.

Protect trees with targeted decisions

Insects and pathogens can damage forests, but not every insect is a pest and not every damaged tree has the same cause. The syllabus includes IPM and removal of affected trees as protective methods.

1. APPLY INTEGRATED PEST MANAGEMENT

Identify and monitor
What is causing damage?

→

Choose a response
Is action warranted?

→

Recheck the result
Has damage or spread fallen?

Combine suitable preventive, biological, physical or chemical methods using evidence about the organism and site. Favor effective options with lower non-target risks. Targeted treatment may be justified, but broad spraying without diagnosis can harm beneficial organisms.

2. REMOVAL CAN INTERRUPT A SOURCE OF SPREAD

Removing affected trees can reduce the amount of infected or infested material available to spread a problem. This is often called sanitation. Its success depends on the organism, timing and handling of removed material. Cutting a tree is not automatically enough: moving untreated infested wood can carry pests elsewhere. Use a disease-specific management plan rather than assuming that every dead tree should be removed.

3. EXTENSION: OAK WILT SHOWS WHY DETAILS MATTER

Oak wilt management can combine removal of infected red oaks, management of the removed wood and measures addressing spread through connected roots. Simply felling a symptomatic tree may leave an underground transmission pathway. This example illustrates the logic of IPM: identify the pathway, match the response and monitor nearby trees. It is not a universal treatment recipe for other forest diseases.

Forest protection methods: College Board, STB-1.G.2.
IPM decision process and control selection: US EPA, Integrated Pest Management Principles.
Oak wilt and infested wood: University of Minnesota, Tree Inspector Study Guide, 2022.

Scope: College Board AP Environmental Science CED, Topic 5.17, p. 113.

Use fire to manage future fire risk

A prescribed burn is an intentionally planned fire carried out by trained teams under specified conditions. In suitable fire-adapted forests, it can reduce hazardous fuels and help restore ecological processes.

1. EXPLAIN THE FUEL-REDUCTION MECHANISM

Leaf litter, small branches and dense understory vegetation can contribute to fuel accumulation. An appropriately planned burn consumes some of these fuels. With less fuel available, a later wildfire may burn less intensely or cause less severe ecological damage.

Planned treatment
Consume selected fuels

→

Reduced fuel load
Less material to burn

→

Lower future risk
Not a guarantee of no fire

Reducing fuels does not prevent lightning or every human ignition. Weather and remaining fuels still influence fire behavior.

2. WEIGH BENEFITS AGAINST SHORT-TERM IMPACTS

Prescribed fire produces smoke and emissions and may damage organisms or escape planned boundaries. Planning can manage these risks, not remove them entirely. Professionals consider weather, fuel conditions, smoke movement and ecological objectives. A treatment suitable for a fire-adapted forest may be inappropriate in another ecosystem. The goal is a justified reduction in overall risk, not burning every forest on the same schedule.

3. EXTENSION: MEASURE THE FOREST RESPONSE

After management, check whether the intended change occurred: seedlings survive after reforestation, pest spread declines after a targeted response, or hazardous fuels fall after treatment. Also track unintended effects on habitat, soil and water. A harvested volume, a tree-planting total or an area burned records activity; it does not by itself demonstrate that the forest is healthy or that the method worked.

Fuel treatment and ecological effects: USDA Forest Service, Prescribed Fire.
Smoke and air-quality impacts: USDA Forest Service, Smoke and Air Quality.
Burn planning and smoke transport: USDA Forest Service, Smoke 101, 2024.

Scope: College Board AP Environmental Science CED, Topic 5.17, p. 113.